Bulletin 149

DEPARTMENT OF THE INTERIOR

FRANKLIN K. LANE, Secretary

BUREAU OF MINES

VAN. H. MANNING, Director

# BIBLIOGRAPHY OF PETROLEUM AND ALLIED SUBSTANCES

## 1915

BY

E. H. BURROUGHS






WASHINGTON
GOVERNMENT PRINTING OFFICE
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# BIBLIOGRAPHY OF PETROLEUM AND ALLIED SUBSTANCES, 1915.

By E. H. Burroughs.

## INTRODUCTION.

Persons interested in the study of petroleum and allied substances have long felt the need of a bibliographic index to the literature. This bibliography, which is intended to be the first of a yearly series, has been compiled by the petroleum division of the Bureau of Mines with a view to satisfying this need. The references include only the more noteworthy writings that appeared during the year 1915 in both the United States and foreign countries. Only patents plainly applicable to the industries in point have been included, although, of course, a close scrutiny of the great volume of patent literature might reveal many other patents of possible value. The references are arranged according to the subject classification on pages 3 to 11. This classification, which is to be followed in the succeeding bibliographies of this series, is offered as a guide for further study and classification of the pertinent literature.

### ACKNOWLEDGMENT.

Acknowledgment is made to W. A. Williams, J. O. Lewis, C. P. Bowie, E. W. Dean, and C. H. Beal of the petroleum division of the bureau for assistance in formulating the scheme of classification and in arranging references thereunder, and also to I. C. Allen and A. S. Crossfield, former members of the petroleum division, whose work formed the basis of the classification as here given. The classified references were examined and prepared for publication by H. C. McGown, bibliographer.

### PUBLICATIONS EXAMINED.

#### SERIALS.

The following list contains the names of the serials examined in preparing this bibliography and the abbreviations used in the text references:

American Chemical Society, journal.....Jour. Am. Chem. Soc.
American Gas Light Journal.....Am. Gas Light Jour.
American Institute of Mining Engineers, bulletin..Bull. Am. Inst. Min. Eng.
American Leather Chemists Association, journal.. Jour. Am. Leather Chemists Assoc.
American Society of Civil Engineers, proceedings...Proc. Am. Soc. Civ. Eng.
American Society of Mechanical Engineers, journal..Jour. Am. Soc. Mech. Eng.

| | |
|---|---|
| American Society of Naval Engineers, journal | Jour. Am. Soc. Naval Eng. |
| American Society for Testing Materials, proceedings and year book. | Proc. and Year Book Am. Soc. Test. Materials. |
| Automobile | Automobile. |
| Berichte der Deutschen Chemischen Gesellschaft | Ber. Deut. chem. Gesell. |
| Better Roads and Streets | Better Roads and Streets. |
| Canadian Engineer | Canadian Engineer. |
| Canadian Mining Institute, bulletin | Bull. Can. Min. Inst. |
| Canadian Mining Institute, transactions | Trans. Canadian Min. Inst. |
| Canadian Mining Journal | Canadian Min. Jour. |
| Chemical Abstracts | Chem. Abs. |
| Chemiker Zeitung | Chem. Ztg. |
| Chemische Industrie | Chem. Ind. |
| Cleveland Engineering Society, journal | Jour. Cleveland Eng. Soc. |
| Cornell Civil Engineer, January–July, 1915 | Cornell Civ. Eng. |
| Dingler's Polytechnische Journal | Dingler's Polytech. Jour. |
| Economic Geology | Econ. Geol. |
| Engineer | Engineer. |
| Engineer Society of Western Pennsylvania, proceedings. | Proc. Eng. Soc., Western Pennsylvania. |
| Engineering | Engineering. |
| Engineering and Contracting | Eng. and Contr. |
| Engineering and Mining Journal | Eng. and Min. Jour. |
| Engineering Magazine | Eng. Mag. |
| Engineering News | Eng. News. |
| Engineering Record | Eng. Rec. |
| Franklin Institute, journal | Jour. Franklin Inst. |
| Fuel Oil Journal | Fuel Oil Jour. |
| Gas Age | Gas Age. |
| Gas World | Gas World. |
| Génie Civil | Génie Civil. |
| Glückauf | Glückauf. |
| Good Roads | Good Roads. |
| Horseless Age | Horseless Age. |
| Institution of Mining Engineers, transactions | Trans. Inst. Min. Eng. |
| Institution of Petroleum Technologists, journal | Jour. Inst. Petroleum Tech. |
| International Marine Engineering | Int. Marine Eng. |
| Journal of Electricity, Power, and Gas (Jan.–June, 1915). | Jour. Elec. Power and Gas. |
| Journal für Gasbeleuchtung und Wasserbesorgung | Jour. Gasbel. |
| Journal of Industrial and Engineering Chemistry | Jour. Ind. and Eng. Chem. |
| Liebig's Annalen (Bände 407–410) | Liebig's Annalen, Bd. 407–410. |
| Metallurgical and Chemical Engineering | Met. and Chem. Eng. |
| Mine, Quarry, and Derrick | Mine, Quarry, and Derrick. |
| Mining and Engineering World | Min. and Eng. World. |
| Mining and Scientific Press | Min. and Sci. Press. |
| Municipal Journal | Munic. Jour. |
| Natural Gas Journal | Nat. Gas Jour. |
| National Petroleum News | Nat. Petroleum News. |
| La Nature | La Nature. |
| Der Oelmotor | Oelmotor. |
| Oil Age | Oil Age. |
| Oil and Gas Journal | Oil and Gas Jour. |
| Oil and Gas Man's Magazine | Oil and Gas Man's Mag. |

| | |
|---|---|
| Oildom | Oildom. |
| Oil, Paint, and Drug Reporter | Oil, Paint, and Drug Rep. |
| Petroleum Age | Petroleum Age. |
| Petroleum Review | Petroleum Rev. |
| Petroleum World | Petroleum World. |
| Petroleum Zeitschrift | Petroleum Ztschr. |
| Power | Power. |
| Practical Engineer | Prac. Eng. |
| Queensland Government Mining Journal | Queensland Gov't Min. Jour. |
| Railway Age Gazette | Rwy. Age Gaz. |
| Railway Review | Rwy. Rev. |
| Resources of Tennessee | Resources of Tennessee. |
| Scientific American | Sci. Am. |
| Society of Chemical Industry, journal | Jour. Soc. Chem. Ind. |
| Society of Engineers (London), transactions | Trans. Soc. Eng. |
| Standard Oil Bulletin | Standard Oil Bull. |
| Texaco Star | Texaco Star. |
| Western Engineering | West. Eng. |
| Worcester Polytechnic Institute, journal | Jour. Worcester Polytech. Inst. |
| Zeitschrift für angewandte Chemie | Ztschr. angew. Chem. |
| Zeitschrift des Vereins deutscher Ingenieure | Ztschr. Ver. deut. Ing. |

### OFFICIAL PUBLICATIONS.

Official publications of the Government that were consulted in preparing this bibliograhy were as follows:

Bureau of Mines, bulletins and technical papers.

Bureau of Standards, circulars.

Corps of Engineers, professional memoirs.

Geological Survey, bulletins, professional papers, geologic folios, Mineral Resources of United States for 1914 (published 1915).

Department of Agriculture, bulletins.

Department of Commerce, Daily Commerce Reports.

Such reports of State geological surveys and mining bureaus and foreign geological surveys and mining bureaus as were published in 1915.

### SCHEME OF CLASSIFICATION.

The scheme of classification followed in arranging the references is outlined below.

## CLASSIFICATION OF SUBJECTS.

### MAIN CLASSES.

| | |
|---|---|
| 000 | General treatises. |
| 100 | Countries and regions. |
| 200 | Geology and origin. |
| 300 | Development and production. |
| 400 | Transportation, storage, and distribution. |
| 500 | Properties and their determination. |
| 600 | Refining and refineries. |
| 700 | Utilization. |
| 800 | Legislation and legal regulations. |
| 900 | Miscellaneous. |

## DETAILED OUTLINE OF CLASSIFICATION.

100 General treatises.

countries and regions (Under each locality follow the classification given under "North America.")

110 North America.

110.001 Historical references and geographic occurrence.
.002 Geology and origin.
.003 Development and production.
.004 Transportation, storage, and distribution.
.005 Properties and their determination.
.006 Refining and refineries.
.007 Utilization.
.008 Statistics (includes Field development, Crude production, Transportation, storage, and distribution, Refineries and refined products, Consumption, Trade reports, Financial and market statistics, General review of the industry).
.009 Legal regulations, economics, maps, miscellaneous.

111 United States.

(Subdivided like class 110.)

111.1 Appalachian field.
111.11 Indiana.
.12 Kentucky.
.13 New York.
.14 Ohio.
.15 Pennsylvania.
.16 West Virginia.
.19 Other States (includes Delaware, Maryland, New Jersey, and Virginia).

111.2 Illinois field.

111.3 Mid-Continent field.
111.31 Kansas.
.32 Louisiana (northern).
.33 Oklahoma.
.34 Texas (eastern and northern).
.39 Other States (includes Arkansas, Iowa, Michigan, Minnesota, Missouri, Nebraska, and Wisconsin).

111.4 Gulf coast field.
111.41 Louisiana (coastal).
.42 Texas (coastal).

111.5 Rocky Mountain field.
111.51 Colorado.
.52 Montana.
.53 Utah.
.54 Wyoming.
.59 Other States (includes Arizona, Idaho, Nevada, New Mexico, North Dakota, South Dakota).

111.6 Pacific coast field.
111.61 California.
.62 Oregon.
.63 Washington.

100 Countries and regions

100 General treatises—Continued.

110 North America—Continued.

111 United States—Continued.

111.9 Miscellaneous.

111.91 Alaska.

.99 Other States (includes Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee).

112 Canada.

113 Mexico.

114 Central America (includes Costa Rica, Guatemala Honduras, Nicaragua, Panama, and Salvador).

115 West Indies.

115.1 Barbados.

.2 Cuba.

.3 Trinidad.

.9 Other islands (includes Haiti, Porto Rico, and Santo Domingo).

120 South America.

121 Argentina.

122 Peru.

129 Other countries (includes Bolivia, Brazil, Chile, Colombia, Ecuador, Uruguay, and Venezuela).

130 Europe.

131 Austria-Hungary.

133 Germany.

134 Great Britain.

136 Roumania.

137 Russia (includes Siberia, Transcaucasia, and Turkestan).

138 Turkey (includes Turkey in Asia).

139 Other countries (includes Balkan States, Belgium, Denmark, France, Greece, Holland, Italy, Norway, Sweden, Spain, Portugal, and Switzerland).

140 Asia.

141 China.

142 India.

143 Japan.

149 Other countries (includes Afghanistan, Arabia, Korea, Persia, and Siam).

For Asiatic Russia, *see* Russia in Europe.

150 Africa.

160 Oceania and Malaysia.

161 Australia.

162 Borneo, Java, and Sumatra.

163 New Guinea (Papua).

164 New Zealand.

165 Philippines.

169 Other islands (includes New Caledonia and Timor).

200 Geology and origin. (See also class 100.)

210 General geology.

220 Stratigraphic distribution.

230 Lithology of bituminous rocks.

240 Geologic structure.

200 Geology and origin—Continued.
250 Origin, theories.
251 Inorganic.
252 Organic.
260 Accumulation.
260.1 Oil and gas reservoir pressures.
270 Applied geology.
270.1 Determination of oil and gas fields.
300 Development and production (oil and gas). *See also* Class 100.
310 Drilling (methods, tools, and equipment).
311 Drilling methods.
311.1 Percussion.
.2 Rotary.
312 Drilling tools.
312.1 Percussion.
.2 Rotary.
313 Equipment.
313.1 Rigs and derricks and parts thereof.
.2 Power.
.3 Casing and fittings.
313.31 Protection against corrosion.
314 Water and waste, control.
314.1 Cement.
.2 Packers.
.3 Mud fluid.
.9 Other methods.
315 Control of large wells and wells on fire.
316 Use of explosives, shooting.
317 Plugging and abandoning.
318 Records of formation, cost, etc.
320 Production (methods, equipment, and operations).
321 Flowing oil wells.
322 Pumping oil wells.
322.1 Tools and equipment.
.2 Power.
.3 Operations.
.4 Special pumping methods.
323 Other methods of oil production.
323.1 Bailing.
.2 Swabbing.
.3 Air lifts.
324 Care of producing oil wells.
324.1 Cleaning out.
.2 Heating and steaming, paraffination.
.3 Agitating.
.4 Use of explosives.
.5 Wells producing water.
.6 Wells with loose sand.
.9 Miscellaneous.
325 Gas wells.
328 Records and costs.

300 Development and production (oil and gas)—Continued.
330 Production (gathering and treatment).
331 Oil.
331.1 Gaging and metering.
.2 Gathering systems.
.3 Cleaning and treating for water, B. S., etc.
.4 Disposal of refuse.
332 Gas and vapors.
332.1 Gaging and metering.
.2 Gathering systems.
.3 Compressors and condensers.
.4 Separation from oil or water.
333 Records and costs.
340 Productiveness of oil and gas wells and lands.
341 Natural factors.
341.1 Character of producing strata.
.2 Character of oils.
.3 Gas and gas pressures.
.4 Geologic conditions.
.5 Influence of water.
.6 Causes of decline.
342 Artificial factors, stimulation of production.
342.1 Mechanical.
.2 Spacing of wells.
.3 Economic.
.4 Stimulation of production.
342.41 Decrease of pressure.
.42 Increase of pressure by air or gas.
.43 Use of water.
343 Records and statistics.
343.1 Graphic and other recording methods.
.2 Productiveness of wells.
.3 Productiveness of oil lands.
344 Estimating content of oil and gas lands.
350 Wastes and conservation.
360 Mining solid bitumens.
390 Financial (appraisements, royalties, contracts, costs, prices).
400 Transportation, storage, and distribution. (*See also* Class 100.)
410 Transportation.
411 Pipe lines (oil or gas).
411.1 Construction and maintenance.
411.11 Protection against corrosion.
.2 Station equipment.
.3 Line equipment and tools.
411.31 Main lines.
.32 Laterals.
.4 Operations.
.5 Losses.
.6 Records and statistics, maps.
.7 Financial, costs.
412 Tank cars and tank wagons.
412.1 Construction and maintenance.
.2 Records and statistics.
.3 Financial, costs.

400 Transportation, storage, and distribution—Continued.
410 Transportation—Continued.
413 Water transportation.
413.1 Tank steamers.
413.11 Construction and maintenance.
.12 Records and statistics.
.13 Financial.
.2 Barges and other modes of conveyance.
420 Storage.
421 Tanks.
421.1 Steel and iron.
.2 Concrete.
.3 Wooden.
422 Reservoirs.
422.1 Earthen.
.2 Concrete lined.
424 Tank and reservoir equipment.
425 Temporary and small containers.
425.1 Equipment.
426 Storage and tank farms.
427 Losses.
428 Records, statistics, maps.
429 Financial.
430 Measurement of volumes and weights; gaging and metering.
440 Fire hazards and prevention—Legal regulations.
450 Local distribution.
460 Sampling.
490 Finances.
500 Properties and their determination. (*See also* Class 100.)
510 Physical properties.
511 Molecular weight.
512 Optical.
512.1 Refractivity.
.2 Polarization.
.3 Photochemical.
513 Density (specific gravity) and coefficient of expansion.
514 Thermal.
514.1 Specific heat and latent heats.
.2 Boiling points and vapor pressures. Evaporation, volatility, fractional distillation.
.3 Melting points, crystallization, cold tests, congealing point.
515 Lubricating value.
518 Other properties of liquids: Viscosity, surface tension, capillarity, diffusion, filtration, solubility, fractional precipitation, emulsion, adsorption.
519 Other properties of solids: Hardness, ductility, toughness, consistency, penetrometry, viscosity.
520 Chemical properties.
521 Thermochemical.
521.1 Flash and burning points, ignition points, and ignition mixtures.
.2 Calorific power and calorimetry.
.3 Illuminating power, burning qualities, and photometry.

500 Properties and their determination—Continued.
520 Chemical properties—Continued.
521 Theromochemical—Continued.
521.4 Thermal decomposition or "cracking."
.9 Miscellaneous, includes properties such as heat of formation, heat of reaction.
523 Elementary analyses.
523.1 Carbon and hydrogen.
.2 Sulphur.
.3 Nitrogen.
.4 Halogens.
524 Analytical numbers (iodine, bromine, saponification, acetyl, sulphuric acid, absorption, etc.).
525 Hydrocarbons and hydrocarbon derivatives.
525.1 Oxygen compounds.
525.11 Cholesterin.
.12 Petroleum acids and acid content.
.2 Halogen compounds.
.3 Reduced hydrocarbons, hydrogenation, and catalysis.
.4 Nitrogen derivatives.
526 Water and solid impurities, sand, B. S., etc.
527 Ash content.
528 Detection of mixtures and adulterants.
529 Miscellaneous and specific tests.
530 Physiological properties.
540 Analytical methods; determination of physical and chemical properties; apparatus and procedure.
550 Power and efficiency tests.
560 Specifications for purchases, etc.
570 Various species and fractions of bitumens and petroleums.
571 Crude oils.
572 Gaseous products, including natural gas.
573 Volatile fractions, including motor oils, gasolines, naphthas, benzines.
574 Illuminating oils.
575 Lubricating, transformer, and switch oils.
576 Residues.
577 Paraffin, ozokerite, ceresin, vaseline, etc.
578 Asphalt, tars, etc.
579 Shales, miscellaneous solid bitumens, lampblack, and coke.
590 Miscellaneous.
600 Refining and refineries. (*See also* class 100.)
610 Processes and practices.
611 Dehydrating and cleaning.
612 Distillation of liquids.
612.1 Continuous.
.2 Batch.
.3 With inert gases or steam.
613 Cracking of liquids.
613.1 Continuous.
.2 Batch.
.3 With catalyzers.
.4 Gasifying and production of lampblack and coke.

600 Refining and refineries—Continued.
610 Processes and practices—Continued.
614 Distillation of solids.
614.1 Oil shales.
615 Condensation.
616 Treatment to improve properties.
616.1 Chemical processes.
616.11 Hydrogenation, oxygenation, halogenation, nitration, and catalysis.
.12 Sulphuric acid refining.
.13 By-products and recovery of reagents.
.14 Oxydation, hardening, and saponification.
.15 Bleaching.
.2 Physical treatment.
616.21 Processes.
616.211 Filtration, refrigeration, and compression.
.212 Extraction.
.213 Emulsification.
.22 Materials.
.23 Apparatus.
.3 Mechanical.
616.31 Centrifugal.
.32 Crushers and breakers.
620 Specific products and their manufacture.
621 Gasoline.
622 Lubricants.
623 Paraffin, vaseline, and mountain wax.
624 Asphalt.
630 Losses, disposal of wastes, fire hazards and prevention.
640 Records and statistics.
650 Construction, equipment, and materials.
690 Miscellaneous.
700 Utilization. (*See also* class 100.)
710 Light.
711 Gas illumination.
712 Liquid fuel illumination.
713 Solid fuel illumination.
720 Heat and power.
721 Steam raising.
721.1 On locomotives.
.2 On ships.
722 Industrial.
722.1 Metallurgical, foundry, and like industries.
.2 Other uses.
723 Furnaces.
724 Burners and burner appliances.
725 Internal-combustion engines (theory and uses).
725.1 Gas engines.
.2 Gasoline engines.
.3 Diesel engines.
.4 Miscellaneous heavy-oil engines.
.5 Carburetors, vaporizers, and sprayers.

700 Utilization—Continued.
720 Heat and power—Continued.
726 Bitumen fuels for internal-combustion engines.
726.1 Fuels for gas and gasoline engines.
.2 Fuels for heavy-oil engines.
727 Substitutes for bituminous fuels in internal-combustion engines.
727.1 Alcohol.
.2 Benzol.
.3 Tar.
728 Domestic heating.
730 Structural uses.
731 Pavement and road building and maintenance.
732 Roofing.
733 Waterproofing and preserving.
734 Paints and paint vehicles (including detection of petroleum substitutes in paint vehicles).
740 Lubrication.
750 Medicinal and pharmaceutical uses.
760 Distribution and marketing methods.
770 Consumption, finances, records, and statistics.
780 Fire hazards.
790 Miscellaneous uses.
791 Boiler compounds.
792 Insecticides and disinfectants.
793 Ore flotation.
794 Manufactured fuels.
795 Dyes and explosives.
796 Soaps.
800 Legislation and legal regulations. (*See also* class 100.)
810 Exploration.
820 Development and production.
830 Transportation, storage, and distribution.
840 Testing and inspection of quality.
850 Refining.
860 Utilization.
870 Tariffs.
890 Miscellaneous.
900 Miscellaneous.
910 Nomenclature.
920 Bibliographies.
930 Organizations and institutions.
940 Expositions and exhibitions.
950 Commerce, trade, and economics.
980 Other specific articles.
990 Other general publications.

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## GENERAL TREATISES.


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2. Day, D. T. Petroleum and natural gas; Mineral Industry during 1914. New York, 1915, pp. 550–583. Reviews industries in United States and foreign countries; gives production, prices, etc.
3. Gray, T. T. The petroleum industry; reprinted from "Industrial chemistry, a manual for student and manufacturer," by Allan Rogers, 2d edition, 1915. New York, 1916, pp. 496 528. Discusses origin and composition; oil fields; refining and production; natural gas, shale oil, ozokerite, and asphalt.
4. Hager, D. Natural gas; its occurrence and properties. Eng. and Min. Jour., vol. 100, 1915, 959-961. Shows geographic distribution; discusses origin, commercial deposits, variations in rock pressure; calculation of gas volumes; and heating value of natural gas and other fuels.
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5a. Johnson, R. H. The relation of the quality of oil to deformation. Econ. Geology, vol. 10, 1915, pp. 676–678. Discusses David White's principles relating to correlation of the rank of coal with the rank or absence of oil; gives history of a reservoir containing oil and gas.

6. Perkin, F. M. Oils, their production and manufacture. Jour. Roy. Soc. Arts, vol. 63, 1915, pp. 837–848, 853–862, 869-875. Gives production, composition, and properties of crude oil; discusses cracking and refining; also gives history of oil-shale industry in Scotland and methods of mining and refining shale.
7. Redwood, B., and Eastlake, A. W. Petroleum technologist's pocketbook. London, 1915, 454 pp. General information about petroleum and natural gas, including occurrence, production, properties, transportation, refining, etc.
8. Richardson, C. Asphalt; Mineral Industry during 1914. New York, 1915, pp. 59-63. Reviews asphalt industry; discusses origin and occurrence of asphalt; gives imports and exports.
9. Walker, G. T. Petroleum, its history, occurrence, production, uses and tests. Minneapolis, 1915, 46 pp.

# NORTH AMERICA.

## OCCURRENCE—GEOLOGY AND ORIGIN.

10. Gould, C. N. Prospecting for oil and gas in North America. Jour. Roy. Soc. Arts, vol. 63, 1915, pp. 721–723. Summarizes origin of oil and gas; explains method of geologist in prospecting.

## UNITED STATES.

### DEVELOPMENT AND PRODUCTION.

11–13. Arnold, Ralph. The petroleum resources of the United States. Econ. Geol., vol. 10, 1915, pp. 695–712. Describes extent of petroleum fields; gives production statistics 1857 to 1914; estimates future supply.

14. Lane, F. K. Development of the mineral resources of the United States: Petroleum and natural gas. Ann. Rept. Sec. U. S. Dept. of the Interior. 1915, pp. 177–182.

Gives petroleum and natural gas production, imports, exports, productive areas, and uses; discusses new inventions, processes and devices, causes of waste, and substitutes for petroleum.

### PROPERTIES AND THEIR DETERMINATION.

15. Sommer, A. Die amerikanischen Asphaltöle (The American asphaltic oils). Petroleum Ztschr., Jahrg. 11, 1915, pp. 151–160. Production of petroleum in United States and Mexico, 1906 to 1913; world production in 1914; refining processes, properties, and uses.

### REFINING AND REFINERIES.

16. Frederick, M. C. The first petroleum refinery in the United States. Overland Monthly, Oct., 1915, pp. 353–358. Mentions particularly Kier refinery in Pittsburgh, Pa., in 1850 and Pico refinery in California.

### STATISTICS.

Field Development, Natural Gas.

17. Natural Gas Journal. Gives location and description of wells in Pennsylvania, Central Ohio, Illinois, Kansas, Oklahoma, Texas panhandle, Louisiana; also, summaries for all fields by districts.

Field Development, Oil and Gas.

18. Oil and Gas Journal. Monthly statement gives location and initial production of completed wells, location of drilling wells, and summary for each field, by districts, with comparisons for preceding months.

19. United States Geological Survey. Mineral Resources for 1914, pt. 2, Nonmetals. Yearly report of development by States.

Imports and Exports of Petroleum.

20. United States Bureau of Foreign and Domestic Commerce. Monthly summary of foreign commerce of the United States.

LIST OF NEW INCORPORATIONS.

21. Natural Gas Journal. Monthly statement lists new companies, chiefly gas companies, in the different States.

PIPE-LINE STATISTICS.

22. Oil and Gas Journal. Monthly report gives runs, deliveries, and stocks in Kansas-Oklahoma region, Texas panhandle, Caddo district, La., California, Pennsylvania, and Illinois.

23. Petroleum Age. Comparative pipe-line statistics for the United States, etc. Monthly statement of runs, receipts, deliveries, gross stocks, and summary by fields.

24. United States Geological Survey. Mineral Resources for 1914, pt. 2, Nonmetals. Gives annual statistics.

PRICES.

25. Fuel Oil Journal. Monthly statement of crude and fuel oil prices.

26. Oil Age. Monthly report; gives also prices of different refined products in Los Angeles, Cal.

27. Oil and Gas Journal. Weekly report of prices throughout the United States.

28. Oil and Gas Man's Magazine. Changes in the price of oil, 1860–1914. Vol. 10, 1915, p. 56.

29. Petroleum Age. Curve showing range of leading grades of United States crude oil, 1910 to 1915. Vol. 2, 1915, p. 21. Includes Pennsylvania, Lima, Illinois, and Oklahoma oil.

PRODUCTION.

30. United States Geological Survey. Mineral Resources for 1914, pt. 2, Nonmetals. Gives annual output and value of petroleum, natural gas, and asphalt, by States.

TANKAGE.

31. Petroleum Age. Monthly statement gives summary of oil in tankage by fields.

## APPALACHIAN FIELD.

### GEOLOGY AND ORIGIN.

32. GARDNER, J. H. A stratigraphic disturbance through the Ohio Valley, running from the Appalachian plateau in Pennsylvania to the Ozark Mountains in Missouri. Bull. Geol. Soc. Am., vol. 26, 1915, pp. 477–483. Discusses the relations, character, and extent of disturbance; intrusive rocks; and geologic features.

### INDIANA.

#### DEVELOPMENT AND PRODUCTION.

32a. BARRETT, EDWARD. Conditions of oil fields and development in Indiana, 1914. Indiana, Dept. Geology and Nat. Res., 39th Ann. Rept., 1915, pp. 14–19.

#### STATISTICS.

33. PETROLEUM AGE. Monthly statement shows average daily production and shipments in the Appalachian and Lima-Indiana fields, by months for five successive years.

*See also* Nos. 17–19, 21–31.

### KENTUCKY.

#### GEOLOGY AND ORIGIN.

34. BUTTS, C. Oil and gas in Jefferson County, Kentucky. Kentucky Geol. Survey, ser. 4, vol. 3, pt. 2, 1915, pp. 238–241. Gives table of results of tests in New Albany shales; discusses prospects of finding oil and gas in commercial quantities.

35. Fohs, F. J. Oil and gas possibilities of Kentucky. Bull. Am. Inst. Min. Eng., March, 1915, pp. 621–628. Study of structure of Kentucky fields; discusses sands of five most promising districts and chances for oil pools, etc.

35a. Munn, M. J. Reconnaissance of oil and gas fields in Wayne and McCreary counties, Kentucky. Abstracted in Jour. Wash. Acad. Sci., vol. 5, 1915, pp. 20–21.

DEVELOPMENT AND PRODUCTION.

36. Steele, G. D. Mining of Kentucky rock asphalt and the construction of rock asphalt macadam roads. Better Roads and Streets, vol. 5, no. 5, 1915, pp. 15–17, 60, 62. Describes asphalt mining in Edmonson County and gives Kentucky rock asphalt specifications.

STATISTICS.

*See* Nos. 17–19, 21–31.

## NEW YORK.

STATISTICS.

*See* Nos. 17–19, 21–31.

## OHIO.

HISTORICAL REFERENCES AND GEOGRAPHIC OCCURRENCE.

37. Oil and Gas Journal. Ohio as an oil-producing State. Vol. 13, May 27, 1915, p. 26. Describes early exploration and beginning of industry in Ohio; geology and occurrence of oil and gas; gives tables showing wells completed to 1914.

38. Van Horn, F. R. Natural gas at Cleveland, Ohio. Bull. Geol. Soc. Am., vol. 26, 1915, p. 102. History of development and account of present conditions.

GEOLOGY AND ORIGIN.

39. Bonine, C. A. Anticlines in the Clinton sand near Wooster, Wayne County, Ohio. Bull. 621, pt. 2, U. S. Geol. Survey, 1915, pp. 87–98. Gives geology of locality, with suggestions for prospecting; discusses need of deeper wells.

STATISTICS.

*See* Nos. 17–19, 21–31.

LEGAL REGULATIONS.

40. Coal Age. Law of Ohio regarding the drilling of oil and gas wells in coal-producing counties. Vol. 7, 1915, p. 119. Extract of article by J. M. Roan on coal mining in Ohio in 1914.

41. Lantz, G. N. Relating to oil and gas wells through coal measures. Coal Age, vol. 7, 1915, pp. 384–385. Gives summary of Ohio law.

## PENNSYLVANIA.

DEVELOPMENT AND PRODUCTION.

42. Oil and Gas Man's Magazine. Itemized cost of the Bradford deep well, Pennsylvania. Vol. 10, 1915, pp. 121–122. Total cost $24,201.17, of which largest items were salaries of drillers and cost of tools.

PROPERTIES AND THEIR DETERMINATION.

43. Better Roads and Streets. New macadam specifications of the city of Philadelphia, Pa. Vol. 5, no. 7, 1915, pp. 26–30. Includes specifications for bituminous surface course, refined asphalt tests, asphaltic cement preparation and properties, and petroleum and tar derivatives.

#### STATISTICS.

*See* Nos. 17–19, 21–31.

#### LEGAL REGULATIONS.

44. Coal Age. Mining laws, legislation and regulations in Pennsylvania. Vol. 7, 1915, p. 216. Discusses need of regulation of coal mining in oil and gas fields; conditions in Greene County.

### WEST VIRGINIA.

#### GEOLOGY AND ORIGIN.

45. Hennen, R. V., and Gawthrop, R. M. Wyoming and McDowell counties; petroleum and natural gas. West Virginia Geol. Survey, County Repts., 1915, pp. 246–257. Shows oil and gas horizons; discusses lack of development and prospective areas.

46. Hennen, R. V., and Reger, D. B. Logan and Mingo counties; petroleum and natural gas. West Virginia Geol. Survey, County Repts., 1915, pp. 224–284. Shows oil and gas horizons; gives summary of tests, well records, and prospective areas.

46a. Krebs, C. E., and Teets, D. D., jr. Boone County; petroleum and natural gas. West Virginia Geol. Survey, County Repts., 1915, pp. 516–560. Shows oil and gas horizons, field development, well records and prospective areas.

#### DEVELOPMENT AND PRODUCTION.

47. White, I. C. Report of Natural Gas Association Committee on Conservation. Proc. Nat. Gas Assoc. of Am., vol. 7, 1915, pp. 145–147: discussion, pp. 147–157. Treats of waste of gas in West Virginia; relation between oil and gas conservation and coal conservation; waste in Mid-Continent fields.

#### STATISTICS.

*See* Nos. 17–19, 21–31.

#### LEGAL REGULATIONS.

48. Oil and Gas Journal. Decision affecting use of gas to make gasoline in West Virginia. Vol. 13, Mar. 4, 1915, p. 26. Refers to right of lessee to use casing-head gas and royalty to be paid to lessor.

### ILLINOIS FIELD.

#### GEOLOGY AND ORIGIN.

49. Kay, F. H. The Carlinville oil and gas field. Bull. 20, Illinois State Geol. Survey, 1915, pp. 81–95. Amplification of Bull. 16, by Blatchley in 1910; gives location of field, history, topography, geology, oil and gas sands, character of oil, its relation to structure, probable extension of field.

50. Lee, Wallace. Oil and gas in the Gillespie and Mount Olive quadrangles. Bull. 31, Illinois State Geol. Survey, 1915, pp. 71–107. Describes stratigraphy and structure as bearing on presence of oil and gas; describes a "kerosene" spring.

51. Morse, W. C., and Kay, F. H. The area south of the Colmar oil field. Bull. 31, Illinois State Geol. Survey, 1915, pp. 10–35. Considers stratigraphy and structure; recommendations for a general plan of prospecting.

52. ——— The Colmar oil field. Bull. 31, Illinois State Geol. Survey, 1915, pp. 38–55. Gives information on oil-bearing beds, possible lower sands, conditions of accumulation, and list of wells.

53. Morse, W. C., and Others. Oil investigations in Illinois in 1914. Bull. 31, Illinois State Geol. Survey, 1915, 111 pp. Contains reports on oil and gas fields and on anticlinal structure in Randolph County.
54. Rich, J. L. The Allendale oil field. Bull. 31, Illinois State Geol. Survey, 1915, pp. 59–68. Describes history, stratigraphy and structure, and possibilities of deeper drilling.
55. Shaw, E. W. The Carlyle oil field and surrounding territory. Bull. 20, Illinois State Geol. Survey, 1915, pp. 43–80. Discusses history, topography, and geology of the field; also gives commercial condition and well records.
56. Weller, Stuart. Anticlinal structure in Randolph County. Bull. 31, Illinois State Geol. Survey, 1915, pp. 69–70. Report and map on small anticline of Chester quadrangle, which may yield oil.

#### STATISTICS.

*See* Nos. 17–19, 21–31.

### MID-CONTINENT FIELD.

#### WASTE AND CONSERVATION.

*See* No. 47.

#### STATISTICS.

*See* Nos. 17–19, 21–31.

### KANSAS.

#### GEOLOGY AND ORIGIN.

57. Gould, C. N. The occurrence and distribution of petroleum and natural gas in the carboniferous rocks of Kansas and Oklahoma. Jour. Inst. Petroleum Tech., vol. 1, pt. 3, 1915, pp. 185–190. Gives geologic structure and future prospects of the more prolific pools.
58. Haworth, Erasmus. On crystalline rocks in Kansas. Bull. 2, Kansas Geol. Survey, 1915, 33 pp. Conditions in vicinity of Manhattan and Zeandale are shown; discusses oil and gas prospects; maps and well records are given.

#### PROPERTIES AND THEIR DETERMINATION.

59. Walker, P. F., and Bohnstengel, Walter. Kansas fuels: coal, oil, gas. Bull. 9, Univ. Kansas, 1915, 50 pp. Heating values and analysis of coal are discussed, and economic effects of washing coal; gives extent of oil and gas fields, analyses and heating values of oil and natural gas.

#### UTILIZATION.

*See* No. 1342.

#### STATISTICS.

*See* Nos. 17–19, 21–31.

### LOUISIANA, NORTHERN.

#### HISTORICAL REFERENCES AND OCCURRENCE.

60. McCue, J. C. Caddo pool. Texaco Star, vol. 2, October, 1915, pp. 13–16. History of discovery of oil and early drilling; character and quality of oil.

#### STATISTICS.

List of New Incorporations.

61. Fuel Oil Journal. Monthly list of new oil and gas companies.

Production.

62. Fuel Oil Journal. Texas and Louisiana output. Gives statistics in monthly statement.

*See also* Nos. 17–19, 21–31.

## OKLAHOMA.

### GEOLOGY AND ORIGIN.

63. Gardner, J. H. Oil pools of southern Oklahoma and northern Texas. Econ. Geol., vol. 10, 1915, pp. 422–434; Bull. Geol. Soc. Am., vol. 26, 1915, p. 102. Describes geologic structure of Healdton and Wheeler pools and concentration of oil and gas.

64. Gould, C. N. The occurrence of asphalt in the State of Oklahoma. Jour. Roy. Soc. Arts, vol. 63, 1915, pp. 132–134. Describes location and occurrence.

65. Hager, Dorsey. Gas pressures and water pressures in Oklahoma. Fuel Oil Jour., vol. 6, April, 1915, p. 64. Shows relation between depth and pressure; computations and hydrostatic theory explained.

65*a*. ———. Geological features of the Oklahoma oil fields. Western Eng., vol. 6, 1915, pp. 13–14. Discusses system of folding and faulting and the causes of oil accumulations.

66. Johnson, R. H., and Huntley, L. G. The equilibrium theory of gas pressures; a reply to Mr. Hager. Fuel Oil Jour., vol. 6, May, 1915, p. 74. Hager's theory refuted. *See also* No. 65.

67. Oil and Gas Journal. Where not to drill for oil in Oklahoma. Vol. 13, Jan. 7, 1915, p. 34. Paper read before Oklahoma Society of Engineers. Reasons given for unfavorable conditions for drilling in various localities.

68. Shannon, C. W., and Trout, L. E. Petroleum and natural gas in Oklahoma. Bull. 19, Oklahoma Geol. Survey, 1915, 133 pp. Gives general information about the geology and occurrence of oil and gas in the State.

69. Snider, L. C. Geology of a portion of northeastern Oklahoma. Bull. 24, pt. 1, Oklahoma Geol. Survey, 1915, 122 pp., 2 pls., 3 figs. Discusses formations, petroleum, and natural gas prospects.

70. Trout, L. E., and Myers, G. H. Bibliography of Oklahoma geology. Bull. 25, Oklahoma Geol. Survey, 1915, 105 pp.

71. Wallis, B. F. The geology and economic value of the Wapanucka limestone of Oklahoma; with notes on the economic value of adjacent formations. Bull. 23, Oklahoma Geol. Survey, 1915, 102 pp., 10 pls., 6 figs.

72. Wegemann, C. H. The Duncan gas field, Stephens County, Oklahoma. Bull. 621, pt. 2, U. S. Geol. Survey, 1915, pp. 43–50. Describes geologic conditions and gives gas analyses.

73. ———. Anticlinal structure in parts of Cotton and Jefferson counties, Oklahoma. Bull. 602, U. S. Geol. Survey, 1915, 108 pp., 5 pls. Geologic conditions shown; gives suggestions for oil and gas prospectors, and list of wells drilled.

74. ———. The Loco gas field, Stephens and Jefferson counties, Oklahoma. Bull. 621, pt. 2, U. S. Geol. Survey, 1915, pp. 31–42. Discusses geologic conditions and origin of oil and gas; gives gas analysis.

75. Wegemann, C. H., and Heald, K. C. The Healdton oil field, Carter County, Oklahoma. Bull. 621, U. S. Geol. Survey, 1915, pp. 13–30. Discusses source of the petroleum.

76. Wegemann, C. H., and Howell, R. W. The Lawton oil and gas field, Oklahoma. Bull. 621, pt. 2, U. S. Geol. Survey, 1915, pp. 71–85. An account of the geology and origin of the gas and oil.

*See also* No. 57.

### TRANSPORTATION, STORAGE, AND DISTRIBUTION.

77. Dunn, B. W. The Ardmore, Oklahoma, explosion. Special Bull. 2, Bureau for the Safe Transportation of Explosives, etc., 1915, New York, 6 pp. Report on explosion caused by escape and vaporization of casing-head gasoline in a tank car.

78. Oil and Gas Journal. Steel storage in Oklahoma. Vol. 14, July 1, 1915, p. 14. An account of steel tank construction in Oklahoma and amount of money invested in storage.

*See also* No. 593.

### REFINING AND REFINERIES.

79. Gould, I. N. The manufacture of gasoline from natural gas in the oil fields of Oklahoma. Jour. Roy. Soc. Arts, vol. 63, 1915, pp. 694–695. Brief explanation of gasoline recovery.

### STATISTICS.

80. Hayden, J. F. Glenn and Cushing pools. Texaco Star, vol. 2, October, 1915, pp. 5–12. Describes development of pools and gives statistics of production for 1914 and 1915.
81. Lane, F. K. Oil and gas industry in Oklahoma, 1915. Ann. Rept. Sec. U. S. Dept. of the Interior, 1915, p. 54. Short review of industry, with figures of production; explains "Foster lease" in Osage Reservation.
82. ——— Oil and gas leases on allotted land of Five Civilized Tribes, 1915. Ann. Rept. Sec. U. S. Dept. of the Interior, 1915, p. 59. Review for fiscal year 1915.
83. ——— Oil and gas operations by Five Civilized Tribes, fiscal year 1915. Ann. Rept. Sec. U. S. Dept. of the Interior, 1915, pp. 62–63. Gives table showing oil and gas wells drilled, abandoned leases, and dry holes for each tribe.

*See also* Nos. 17–19, 21–31.

### LEGAL REGULATIONS AND ECONOMICS.

84. Corporation Commission of Oklahoma. Findings of fact, opinion and order, in the matter of the conservation of natural gas; cause no. 2325, order no. 937. House Bill 395, State of Oklahoma session laws of 1915. Order to be in force on and after Sept. 1, 1915.
85. Johnson, R. N., and Huntley, L. G. The influence of the Cushing pool on the oil industry. Proc. Eng. Soc. W. Pa., July, 1915, pp. 460–472; discussion, pp. 472–487. General conditions of pool are described and future possibilities discussed.
86. Natural Gas Journal. Conservation being pushed. Vol. 9, 1915, pp. 64–65. Text of bill prepared with aim of conserving natural gas in Oklahoma.
87. Oil and Gas Journal. Insurance rates on oil in Oklahoma. Vol. 14, Sept. 9, 1915, p. 30. Gives table of rates on oil approved by State Board.
88. United States Bureau of Corporations. Conditions in the Healdton oil field. 1915, 116 pp. Report on investigation ordered by U. S. Senate to determine cause of reduction in price of crude oil in Ardmore oil field.

## TEXAS, EASTERN AND NORTHERN.

### GEOLOGY AND ORIGIN.

89. Chautard, J. L'origine des mounds pétroliferes du Texas et de la Louisiane (Origin of petroleum-bearing mounds of Texas and Louisiana). Compt. rend., t. 160, 1915, pp. 69–72.
90. Phillips, W. B. Oil prospects in Texas. Oil and Gas Jour., vol. 13, Apr. 15, 1915, p. 25. Possibilities and geology of the Strawn and Thrall fields.
91. Udden, J. A. Oil in an igneous rock. Econ. Geol., vol. 10, 1915, pp 582–585. Discusses geologic conditions in the Thrall field, Texas, and quality of the oil.
92. ——— Thrall oil in serpentine. Oil and Gas Jour., vol. 13, Apr. 22, 1915, p. 27. Describes conditions leading to accumulation of liquid hydrocarbons and geologic structure of Thrall field.
93. Wegemann, C. H. Reconnaissance for oil near Quanah, Hardemann County, Texas. Bull. 621, pt. 2, 1915, pp. 109–115. Describes geologic conditions of the region and discusses possible production of oil.
94. ——— A reconnaissance in Palo Pinto County, Texas, with special reference to oil and gas. Bull. 621, pt. 2, U. S. Geol. Survey, 1915, pp. 51–59. History of development; description of gas seeps, geologic structure, and contours, occurrence of oil and gas.

*See also* No. 63.

STATISTICS.

*See* Nos. 17–19, 21–31.

LEGAL REGULATIONS.

95. Wilkinson, A. E. Law of oil and natural gas; handbook of statutes of Texas and decisions of courts relating to oil and natural gas, organization and operation of oil and gas companies, etc. Austin, Tex., 1915, 162 pp.

IOWA.

GEOLOGY AND ORIGIN.

96. Kay, G. F. Oil and gas in Iowa. Iowa Geol. Survey, Administrative Rept., vol. 23, 1915, pp. 25–47. Geologic conditions and records of strata; lack of indications of oil, and little gas.

*See also* No. 32.

UTILIZATION.

*See* No. 1343.

MISSOURI.

STATISTICS.

97. Natural Gas Journal. Gas in the State of Missouri. Vol. 9, 1915, pp. 70–71. Statistics of production, consumption, and price of natural gas and manufactured gas in 1914.

*See also* Nos. 17–19, 21–31.

## GULF COAST FIELD.

STATISTICS.

*See* Nos. 17–19, 21–31.

LOUISIANA, COASTAL.

GEOLOGY AND ORIGIN.

97a. Norton, E. G. The origin of the Louisiana and East Texas salines. Bull. Am. Inst. Min. Eng. January, 1915, pp. 93–102; discussion, May, 1915, pp. 1120–1122.

*See also* No. 192.

TEXAS, COASTAL.

GEOLOGY AND ORIGIN.

97b. Dumble, E. T. Problem of the Texas tertiary sands. Bull. Geol. Soc. Am., vol. 26, 1915, pp. 398, 447–476. Discusses geologic formations of East Texas.

PROPERTIES AND THEIR DETERMINATION.

98. Heyne, H. R. Southeast Texas oil. Fuel Oil Jour., vol. 6, September, 1915, pp. 24–26. Describes characteristics and properties of the oil; treatment for removal of impurities by steaming; refining methods; asphalts and tests of asphalt, naphtha, and kerosene are also discussed.

## ROCKY MOUNTAIN FIELD.

STATISTICS.

*See* Nos. 17–19, 21, 23, 24, 30, 31.

COLORADO.

GEOLOGY AND ORIGIN.

99. DeBeque, G. R. Bituminous shales of Colorado. Eng. and Min. Jour., vol. 99, 1915, pp. 773–774. Experiments show that Colorado shales should equal in value the Scotch and French shales from which petroleum is manufactured.

99a. Foote, F. W. The Florence, Colorado, oil field. Mexican Min. Jour., vol. 19, 1915, pp. 48–49.

STATISTICS.

*See* Nos. 17–19, 21–31.

MONTANA.

GEOLOGY AND ORIGIN.

100. Bowen, C. F. Possibilities of oil in the Porcupine Dome, Rosebud County, Montana. Bull. 621, pt. 2, U. S. Geol. Survey, 1915, pp. 61–70. Study of geology of region and application of principles of accumulation of oil and gas.

101. Rowe, J. P. The oil and gas deposits of Montana. Petroleum Rev., vol. 32, 1915, pp. 387–388. Proximity to Canada and Wyoming favors finding of oil and gas; map of region given and field described.

102. ——— Probable oil and gas in Montana. Eng. and Min. Jour., vol. 99, 1915, pp. 647–649. Account of prospecting and results; geology of Sweetgrass Hill region shows promising field.

UTAH.

STATISTICS.

*See* Nos. 17–19, 21–31.

WYOMING.

HISTORICAL REFERENCES AND OCCURRENCE—GEOLOGY AND ORIGIN.

103. Hintze, F. F. The Basin and Greybull oil and gas fields, Bighorn County, Wyo. Bull. 10, Wyoming Geol. Survey, 1915, 62 pp. Describes development of fields, geology and occurrence of oil and gas, and gives list of wells drilled.

104. ———. The Little Buffalo Basin oil and gas field, and the Grass Creek oil and gas field. Bull. 11, Wyoming Geol. Survey, 1915, 120 pp. Study of geologic conditions of the fields, oil and gas occurrence, and possible development; well logs and geologic maps given.

105. Oil and Gas Journal. Gas in Little Buffalo Basin. Vol. 14, Oct. 7, 1915, p. 32. Describes location, topography, and geology of field, also some of the wells.

106. ——— Geology of the Grass Creek field of Wyoming. Vol. 14, Sept. 30, 1915, pp. 25–26. Describes location, drainage, geologic conditions, and some of the wells drilled.

107. ——— Big Horn Basin of Wyoming. Vol. 14, Nov. 4, 1915, pp. 26–27. Discusses occurrence of oil and gas, geology, and topography.

DEVELOPMENT AND PRODUCTION.

108. Petroleum Age. Oil prospects in Wyoming. Vol. 2, March, 1915, pp. 3–8. Development in Wyoming to date, with descriptions of Grass Creek and Salt Creek fields.

109. Natural Gas Journal. Extinguishing burning oil and gas well in Wyoming. Vol. 9, 1915, p. 192. Describes a 1,400-foot well struck by lightning, and method of extinguishing fire.

UTILIZATION.

110. Calvert, W. R. The utilization of Wyoming natural gas. Nat. Gas Jour., vol. 9, 1915, pp. 66–67. States that Wyoming gas is little used on account of market conditions; describes prospects for making gasoline; occurrence and analyses of gas in Greybull, Byron, Salt Creek, and other fields.

STATISTICS.

*See* Nos. 17–19, 21–31.

### NEW MEXICO.

#### LEGAL REGULATIONS.

111. Mining and Engineering World. Contract for operating State oil lands in New Mexico. Vol. 43, 1915, p. 1022. Reviews important provisions of contract.

## PACIFIC COAST FIELD.

### CALIFORNIA.

#### HISTORICAL REFERENCES AND OCCURRENCE.

111a. McLaughlin, R. P., and Waring, C. A. Petroleum industry of California. Bull. 69, California State Min. Bur., 1915, 519 pp. Discusses extent and location of deposits, cost of extracting the oil, and the marketing and financial conditions of the industry.

112. Payne, W. Getting into oil. Saturday Evening Post, March 27, 1915, pp. 8–9, 69–70, 73–74. History of oil discovery and development in California.

113. Prutzman, P. W. Notes on the Santa Maria oil fields, California. West. Eng., vol. 6, 1915, pp. 256–257. Discusses general conditions in this field.

#### GEOLOGY AND ORIGIN.

114. Anderson, R., and Pack, R. W. Geology and oil resources of the west border of the San Joaquin Valley north of Coalinga, Cal. Bull. 603, U. S. Geol. Survey, 1915, 220 pp. Physical and geologic features of region are given and the prospects of finding oil.

115. Hager, Dorsey. The new South Mountain oil field, Ventura County, California. West. Eng., vol. 5, 1915, pp. 341–342. Dicusses the geological structure of the field.

116. Standard Oil Bulletin. Rancho La Brea's fossil beds. Vol. 2, March, 1915, pp. 3–6. Explains and describes origin of fossils.

116a. Arnold, Ralph. Petroleum resources and industries of the Pacific coast. Nature and Science on the Pacific Coast, San Francisco, 1915, pp. 75–87.

#### DEVELOPMENT AND PRODUCTION.

117. Lombardi, M. E. The cost of maintaining production in California oil fields. Bull. Am. Inst. Min. Eng., Sept.–Dec., 1915, pp. 2109–2114; discussion, p. 2427. Gives cost of drilling new wells, also factors in and cost of production.

118. Oil and Gas Journal. Gas waste in Los Angeles. Vol. 14, Oct. 21, 1915, p. 28. Briefly discusses waste and its causes; investigation by board of public utilities in Fullerton field.

119. Requa, M. L. Valuation of California oil lands. Bull. Min. and Met. Soc. Am., vol. 8, 1915, pp. 126–137. Explains conditions leading to valuation of lands now being made and methods of valuation.

120. Salisbury, G. H. Coalinga well-drilling costs. Oil Age, vol. 11, February, 1915, p. 2. Estimation of cost for well drilled in western part of field; prices cut 20 to 50 per cent by new methods and appliances used.

### CALIFORNIA.

#### TRANSPORTATION, STORAGE, AND DISTRIBUTION.

121. Bowie, C. P. Pumping California oil. Eng. News, vol. 74, 1915, pp. 1068–1071. Describes method for laying out pipe lines and pumping stations and explains various pumping systems.

122. Cole, E. D. Concrete-lined oil-storage reservoirs in California: Construction, methods, and cost data. Proc. Am. Soc. Civ. Eng., vol. 41, 1915, pp. 1327–1350; discussion, pp. 2457–2458; vol. 42, 1916, pp. 143–146, 229–232, 557. Describes briefly construction of concrete-lined earthen reservoirs for storing crude oil; gives cost of storage per barrel capacity; losses of oil due to evaporation and seepage are shown.

123. Engineering Record. California oil pipe-line 200 miles long built in record time of 15 months. Vol. 72, 1915, pp. 294–296. Description of line from San Joaquin Valley to San Pedro; pipe-screwing machine was used; 16 pumping stations were installed.

### PROPERTIES AND THEIR DETERMINATION.

124. Crossfield, A. S. The coefficient of expansion of California crude oils and distillate. West. Eng., vol. 6, 1915, pp. 229–238. Summary of results of United States Bureau of Mines investigation is given.

125. Engineering Record. Device tests adhesiveness of California road oils. Vol. 71, 1915, p. 329. Apparatus consists of a journal lubricated with oil under test and operated by a constant pull of a given weight causing an outer cylinder to revolve.

### REFINING AND REFINERIES.

126. Bell, A. F. L. Important topping plants of California. Bull. Am. Inst. Min. Eng., September, 1915, pp. 1769–1799; discussion, December, 1915, p. 2426. Gives detailed account of plants, with illustrations, statistical data, etc.

127. Hardison, S. J. The dehydrating oil plant of Nevada Petroleum Co., California. Bull. Am. Inst. Min. Eng., March, 1915, pp. 637–644. Oil can not be heated by use of exhaust steam coils on account of the low temperature. Separation of the oil and water will occur when the temperature is high enough to generate steam and cause an explosion in the oil-enveloped globules of water.

128. Oil City Derrick. Casing-head gasoline in California, 1915. Dec. 21, 1915. Shows variation in amount of gasoline obtainable; gives list of companies and number of gallons made per day, also methods of marketing.

### UTILIZATION.

129. Adams, W. H. The Diesel engine and its application in Southern California. Jour. Am. Soc. Mech. Eng., vol. 37, 1915, pp. 621–628. Outlines Diesel engine designs and tendencies, and considers operation of engine with various fuels; tables, charts, cost data, etc., are given.

130. Davol, G. K. California's first Diesel engine plant. West. Eng., vol. 5, 1915, pp. 296–305. Describes plant installed in San Francisco and performance of Diesel engine in stationary service using California oil.

131. Haas, H. Diesel engine installation at Palo Alto. Power, vol. 41, 1915, pp. 502–504. By installing a 300-horsepower Diesel engine to carry day load and using one of the steam units to help out on the peak, power costs were considerably lessened; heavy California residue is used.

*See also* No. 1077.

### STATISTICS.

Field Development and Production.

132. California State Mining Bureau. Bulletins.

133. Oil Age. Monthly statement by fields, with daily average production.

*See also* Nos. 17–19, 30.

134. McLaughlin, R. P. California petroleum in 1914. West. Eng., vol. 5, 1915, pp. 391–393. Summary of operations and statistics of production and investment.

NEW OIL COMPANIES.

135. Oil Age. Monthly statement shows new companies and prices of all grades of oil, by fields.

*See also* No. 21.

PRICES.

135a. Oil Age. Monthly statement showing prices of all grades of oil, by fields.

*See also* No. 26.

#### LEGAL REGULATIONS AND ECONOMICS.

136. CALIFORNIA STATE MINING BUREAU. Laws of the State of California regulating the drilling of petroleum and gas wells. 1915, 34 pp. *See also* Bulletin 71 and California statutes and amendments to the codes, 41st sess., 1915.

137. EDDY, L. H. Regulation of oil and gas wells in California. Eng. and Min. Jour., vol. 100, 1915, pp. 383–384. *See also*, for text of bill, Oil Age, vol. 11, June, 1915, pp. 6–10. California State Senate bill No. 916, known as the Maddux bill, California statutes and amendments to the codes, 41st session, 1915; the law provides for State control of oil and gas wells under direction of State Mineralogist and creates in the State Mining Bureau a branch known as the department of petroleum and gas.

138. GOOD ROADS. Standard specifications for road oiling and for road oil for earth and macadam roads in Los Angeles County, California. Vol. 10, 1915, pp. 292–293. Specifications relate to manner of preparing surface, applying, and distributing the oil, and physical properties of the oil.

139. PAYNE, W. Competition in oil. Saturday Evening Post, Apr. 3, 1915, pp. 8–9, 85–86. Popular discussion of oil business in California and factors affecting its success or failure.

140. WOLF, J. H. G. California petroleum and the European war. West. Eng., vol. 6, 1915, pp. 166–168. Reviews petroleum industry in California since outbreak of European war, and during years immediately preceding; necessity for combination of small producers.

### WASHINGTON.

#### GEOLOGY AND ORIGIN.

141. WEAVER, C. E. The possible occurrence of oil and gas fields in Washington. Bull. Am. Inst. Min. Eng., July, 1915, pp. 1419–1421; discussion, December, 1915, pp. 2431–2433. Prospects for occurrences of petroleun are umfavorable owing to geologic conditions.

## OTHER FIELDS.

### STATISTICS.

*See* Nos. 17–19, 21–31.

### ALASKA.

#### OCCURRENCE—DEVELOPMENT.

142. BROOKS, A. H. The petroleum fields of Alaska. Bull. Am. Inst. Min. Eng., February, 1915, pp. 199–207. Describes development of Katalla, Yakataga, Iniskino Bay, Cold Bay, Smith Bay fields, also character of oil.

#### STATISTICS.

143. United States Bureau of Foreign and Domestic Commerce. Monthly summary of foreign commerce of the United States. Shows quantity and value of crude and refined mineral oils shipped from United States to Alaska, by kinds of oil.

### TENNESSEE.

#### GEOLOGY AND ORIGIN.

144. Glenn, L. C. Recent oil developments near Oneida, Scott County, Tenn. Resources of Tenn., vol. 5, 1915, pp. 174–194. Gives history and well records; describes drilling, geologic structure, etc.

### FLORIDA.

#### UTILIZATION.

145. Foote, C. E. Sand-asphalt may solve Florida road problem. Eng. Rec., vol. 71, 1915, pp. 622–623. Describes road after two years' service, mileage now under construction, and possible future.

*See also* No. 1355.

## CANADA.

### HISTORICAL REFERENCES AND OCCURRENCE.

146. Clapp, F. G., and others. Petroleum and natural gas resources of Canada. Bull. 291, vols. 1 and 2, Canada, Mines Branch, 1915. Describes the geology and development of the various fields; gives analyses of oils and mentions their uses; statistics of oil and gas production, and Government laws relating to oil and gas.

147. Lauriston, V. Ontario's gas fields. Mine, Quarry, and Derrick, vol. 1, 1915, p. 156. Gives brief description of fields.

### GEOLOGY AND ORIGIN.

148. Bosworth, T. O. The oil fields of Western Canada. Petroleum World, vol. 12, 1915, pp. 85–92. Describes prospecting and development of various regions for oil.

149. ——— The prospective oil fields of Western Canada. Petroleum Rev., vol. 32, 1915, p. 123. Review and criticism of Cunningham-Craig's paper. (See No. 151.)

150. Campbell-Johnston, R. C. Suggested origin of the petroleum occurring in Western Canada. Mining Jour., vol. 108, 1915, pp. 183, 205–206. Gives results of a geological study of the region; concludes that the oil is derived from direct distillation of coal beds.

151. Cunningham-Craig, E. H. The Alberta oil fields. Canadian Min. Jour., vol. 36, 1915, pp. 26–28. Report of the Calgary oil district. Whether petroleum can be produced on a commercial scale not proved.

152. ——— The prospective oil fields of Western Canada. Jour. Inst. Petroleum Tech., vol. 1, 1915, pp. 127–138; discussion, pp. 138–145; Petroleum Rev., vol. 32, 1915, pp. 82, 102; Petroleum World, vol. 12, 1915, pp. 75–80. Reviews geological data and gives history of development and future prospects.

153. ——— The puzzle of the Calgary field. Petroleum World, vol. 12, 1915, pp. 335–336. Results obtained in various bore holes compared; migration of the oil shown.

153a. Dowling, D. B. Structural features of the Alberta oil fields. Canadian Min. Jour., vol. 36, 1915, pp. 335–336. Study of fractures in relation to oil accumulation; shows development of some oil wells.

154. DeLury, J. S. The principles underlying the occurrence of oil and gas and their application to Western Canada. Canadian Min. Jour., vol. 36, 1915, pp. 331–333. Review of the geologic formation and the occurrence of oil.

155. Dickie, F. J. Gas fields of Alberta, Canada. Oil and Gas Man's Mag., vol. 10, 1915, pp. 37–38. Short account of the Pelican Portage and Viking gas wells.

156. Dowling, D. B. Correlation and geological structure of the Alberta oil fields. Bull. Am. Inst. Min. Eng., June, 1915, pp. 1355–1364. Detailed geologic description of region, with map and diagrams.

157. ——— Structural geology of the Alberta oil fields. Trans. Can. Min. Inst., 1915, pp. 182–191; Bull. 35, Can. Min. Inst., 1915, pp. 164–172. Discusses problems in the stratigraphy: gives diagrams and table of formations; development of wells shown.

158. Huntley, L. G. The oil fields of Calgary. Petroleum World, vol. 12, 1915, p. 247. Author takes issue with Cunningham-Craig and Bosworth concerning origin of the oil.

159. ——— Oil, gas, and water content of Dakota sand in Canada and United States. Bull. Am. Inst. Min. Eng., June, 1915, pp. 1333–1353; discussion, December, pp. 2428–2430. Discusses the age, character, and deposition of the Dakota sand, extent of its outcrops in Canada, and points out the most favorable areas for testing gas and oil.

160. Johnson, H. R. Preliminary notes upon the geology of Western Alberta and Southeastern British Columbia. Oil Age, vol. 11, February, 1915, pp. 6–7; March, 1915, pp. 6–8. Describes geographic and geologic conditions.

161. Kempher, L. S. Notes on the geology of part of southern Alberta. Mine, Quarry, and Derrick, vol. 1, 1915, pp. 8–10, 51. Describes structural and economic geology; also gives table of formations.

162. Malcolm, Wyatt. The oil and gas fields of Ontario and Quebec. Memoir 81, Canada, Geol. Survey, 1915, 248 pp. Discusses sources of oil and gas in anticlines; gives difference between Canada and United States oils; methods of pumping wells, and costs.

162a. Slipper, S. E. Calgary gas and oil field (Alberta). Canada, Geol. Survey, Summ. Rept., 1914, 1915, pp. 143–145. Samples from wells were examined for purpose of prospecting for oil in Southern Alberta.

163. Stauffer, C. R. Devonian of Southwestern Ontario. Memoir 34, Canada, Geol. Survey, 1915, 1341 pp. Deposits and economic products are discussed; origin and analysis of a black shale are given; contains an extensive bibliography.

163a. Tyrrell, J. B. Oil possibilities of British Columbia. Bull. Am. Inst. Min. Eng., December, 1915, pp. 2432–2433. Discussion of paper by C. E. Weaver and the geologic formation of region.

164. Williams, M. Y. Arisaig-Antigonish district, Nova Scotia. Memoir 60, Canada, Geol. Survey, 1915, 173 pp. Geological review of the district where copper, iron, oil-shale, gypsum, and limestone are the principal economic deposits.

*See also* No. 146.

## DEVELOPMENT AND PRODUCTION.

165. Knight, C. W. Records of wells drilled for oil and gas in Ontario. Ann. Rept., Ontario Bureau of Mines, vol. 24, pt. 2, 1915. States origin of oil and gas, formation of oil and gas pools; shows geological structure of the western peninsula; describes fields and gives statistics of production.

166. Oil and Gas Journal. Gas conservation in Canada. Vol. 14, September 9, 1915, p. 28. Briefly reviews occurrences of gas in Canada; waste in Pelican Portage well in northern Alberta; lack of restrictive legislation in all provinces, except Ontario.

*See also* No. 146.

## PROPERTIES AND THEIR DETERMINATION.

167. Gas World. Calorific value test in Canada. Vol. 63, 1915, pp. 353–354. A detailed discussion of testing calorific value of gas; British thermal unit is adopted.

168. McGrath, J. W. The oil-shales of Newfoundland. Canadian Min. Jour., vol. 36, 1915, p. 493; Petroleum Rev., vol. 33, 1915, p. 209. Describes deposits that are richer in oil than Scotch oil shales.

169. Mickle, G. R. Chemical composition of natural gas found in Ontario, Canada. Nat. Gas Jour., vol. 9, 1915, pp. 15–16. Shows importance of sampling gas at wells and not from pipe lines; methods of sampling and apparatus are illustrated.

170. Petroleum World. Analysis of oil from the Dingman well, Calgary. Vol. 12, 1915, pp. 93–94. Gives results of tests; concludes that the oil must be a secondary deposit and that the primary petroleum from which the oil is derived should be of best quality.

171. Voss, E. G. Analyses of some Alberta petroleums. Mine, Quarry, and Derrick, vol. 1, 1915, p. 182. Gives table of analyses of five samples; discusses the need for standardization of oil-testing methods and its value to the practical refiner.

*See also* No. 146.

## STATISTICS.

Field Development and Production.

172. Canada, Geol. Survey. Memoirs.

173. Canada, Mines Branch. Annual report on mineral production of Canada; Bulletins.

174. Great Britain, Mines and Quarries. General Report, with statistics (annual), by chief inspector of mines; pt. 4, Colonial and foreign statistics.

175. Heaton, E., Robinson, J. B., and Dobson, W. J. Heaton's Annual, 1915. Toronto, 514 pp. Reference work on Canada; contains material on mining and an economic bibliography of all Government reports.

176. Hore, R. E. The Canadian mining manual, 1915. Toronto, 1916, 432 pp. Describes briefly oil fields and gives production figures for 1915.

Prices of Canadian Petroleum.

177. Oil and Gas Journal. Weekly report. List prices of grades of Canadian oil under "Eastern States."

*See also* No. 146.

## LEGAL REGULATIONS.

178. Canadian Mining Institute. Quebec petroleum regulations. Bull. 41, 1915, p. 645. Reviews mining law adopted in the province of Quebec concerning oil and gas.

*See also* No. 146.

## MAPS.

179. Ells, S. C. Christina River map, showing outcrops of bituminous sand along Christina Valley; contour intervals of 20 feet. Canada, Mines Branch, 1915, scale 1,000 feet to 1 inch.

180. ——— Clearwater River map, showing outcrops of bituminous sand along Clearwater valley; contour interval 20 feet. Canada, Mines Branch, 1915; scale 1,000 feet to 1 inch.

181. ——— Hangingstone-Horse rivers, showing outcrops of bituminous sand along Hangingstone and Horse River valleys; contour interval 20 feet. Canada, Mines Branch, 1915, scale 1,000 feet to 1 inch.

182. ——— McKay River, three sheets, showing outcrops of bituminous sand along McKay Valley; contour interval 20 feet. Canada, Mines Branch, 1915, scale 1,000 feet to 1 inch.

183. ——— Moose River, showing outcrops of bituminous sand along Moose Valley; contour interval 20 feet. Canada, Mines Branch, 1915, scale 1,000 feet to 1 inch.

184. ——— Steepbank River, showing outcrops of bituminous sand along Steepbank Valley; contour interval 20 feet. Canada, Mines Branch, 1915, scale 1,000 feet to 1 inch.

## MEXICO.

### HISTORICAL REFERENCES AND OCCURRENCE—DEVELOPMENT.

184a. Day, D. T., and others. The oil fields of Mexico. Bull. Am. Inst. Min. Eng., April, 1915, pp. 817–818. Discusses paper of Ezequiel Ordoñez and the occurrence of Mexican oil.

185. Flores, M. Apuntes sobre el petróleo mexicano (Notes on Mexican petroleum). Petróleo, vol. 3, nos. 78–86, 1915. Describes development, present situation, and future of the industry.

186. Garfias, V. R. Oil regions of northwestern Mexico. Econ. Geol., vol. 10, 1915, pp. 195–225. Describes origin of the petroleum; gives history of development, methods of drilling, and statistics; bibliography.

187. Huntley, L. G. The Mexican oil fields. Bull. Am. Inst. Min. Eng., September, 1915, pp. 2067–2107. Historical, statistical, and chronological account of discoveries and operations by principal producers; table of annual production 1904 to 1914; refinery products, and list of operating companies are given.

188. Stewart, P. C. A. The petroleum industry of Mexico. Jour. Inst. Petroleum Tech., vol. 2, pt. 5, 1915, pp. 7–37; discussion, pp. 37–43; Petroleum Rev., vol. 33, 1915, pp. 335–338, 356, 375–376; Petroleum World, vol. 12, 1915, pp 539–548; Jour. Soc. Chem. Ind., vol. 35, 1916, pp. 295–296. General article describing the different fields, topographic and climatic conditions, geology, development, operators; gives data on storage tanks, pipe lines, pumping stations, and refineries, transportation by rail and water, properties of Mexican oils, and bibliography.

189. Wittich, E. Datos históricos y estadísticos del petróleo y el bitumen de México (Historical data and statistics of Mexican petroleum and bitumen). Petróleo, vol. 3, no. 60, 1915, pp. 5, 7. Briefly reviews development of the industry, with production figures for 1897 to 1905.

### GEOLOGY AND ORIGIN.

190. De Golyer, E. The effect of igneous intrusions on the accumulation of oil in the Tampico-Tuxpam Region, Mexico. Econ. Geol., vol. 10, 1915, pp. 651–662. Discusses occurrence and origin of oil; the principal function of igneous intrusion has been the formation of channels through which oil has migrated into overlying formations until it has reached the surface.

191. ——— The Furbero oil field, Mexico. Bull. Am. Inst. Min. Eng., September, 1915, pp. 1899–1911. Gives location, history and development, and geology of the field; occurrences of oil, and factors of accumulation.

192. Dumble, E. T. The occurrences of petroleum in Eastern Mexico as contrasted with those in Texas and Louisiana. Bull. Am. Inst. Min. Eng., August, 1915, pp. 1623–1638. Discussion, December, 1915, pp. 2434–2435.

192a. Garfias, V. R. General notes on Mexican oil fields. Yearbook, Geol. Min. Soc. Amer. Univ., vol. 2, 1915, pp. 15–17.

193. González, J. M. Yacimentos de petróleo (Occurrence of petroleum). Petróleo, vol. 3, No. 50, 1915, p. 4. Describes geology and petroleum deposits in Mexico.

### PROPERTIES AND THEIR DETERMINATION.

194. Heyne, H. R. Properties and products of Mexican crude petroleum. Fuel Oil Jour., vol. 6, November, 1915, pp. 44–47. Gives characteristics of oil, uses, and products of refining.

195. Oil and Gas Journal. Analyses of Mexican oils. Vol. 14, Nov. 18, 1915, pp. 21–22. Gives analyses of Tampico-Tuxpam, Panuco, Topila, and southern field oils.

196. Petróleo. Análisis del Petróleo Mexicano (Analysis of Mexican petroleum). Vol. 3, no. 84, 1915, pp. 4–5. Gives analyses of oils from various sections in Mexico.

197. Smith, J. T. How to tell Mexican oil. Petroleum World, vol. 12, 1915, pp. 606–607. Conclusions based on investigations to ascertain effect of viscosity of an oil fuel upon its flow in a pipe. Peculiar behavior of Mexican oil may be used to distinguish that oil from any other.

*See also* No. 188.

### UTILIZATION.

198. Cowdray, Lord. Mexican fuel oil and its application to marine propulsion. Siren and Shipping, vol. 77, 1915, pp. 160–162; Petroleum Rev., vol. 33, 1915, pp. 357–358. Utilization discussed; economy in use under boilers and internal-combustion engines.

### STATISTICS.

Production of Petroleum, Natural Gas, and Asphalt.

199. United States Geological Survey. Mineral Resources for 1914, pt. 2, Nonmetals. Gives annual production statistics.

*See also* Nos. 186, 187, 189.

## CENTRAL AMERICA.

### HISTORICAL REFERENCES AND OCCURRENCE.

200. Jones, C. L. Oil on the Caribbean and elsewhere. North Am. Rev., October, 1915, pp. 536–543. Discusses control of oil fields as a factor in international politics and economic growth. Surveys oil resources of the West Indies, Central and South America.

201. Petróleo. La industria del petróleo en Centro y Sud-América (The petroleum industry in Central and South America). Vol. 3, Feb. 6, 1915, p. 4. Briefly reviews conditions in important petroleum-producing countries.

202. Reid, W. A. Petroleum in the Americas. Bull. Pan-Am. Union, vol. 40, 1915, pp. 24–36; Petroleum Rev., vol. 32, 1915, pp. 475–476; Oil and Gas Jour., vol. 13, Mar. 18, 1915, p. 26. Reviews occurrences and general conditions in oil countries of Central and South America.

### TRANSPORTATION, STORAGE, AND DISTRIBUTION.

203. Blardone, G. How fuel oil is handled and stored in the Panama Canal Zone. Oil and Gas Jour., vol. 14, Oct. 14, 1915, pp. 23–24; Petroleum Rev., vol. 33, 1915, pp. 365–366. Describes two tank-farm sites on Zone; companies erect own steel storage; gives regulations for pumping, etc., and names of companies holding tankage.

### STATISTICS.

204. United States Geological Survey. Mineral Resources for 1914, pt. 2, Nonmetals. Gives annual production statistics of petroleum, natural gas, and asphalt.

## WEST INDIES.

### OCCURRENCE.

*See* No. 200.

## STATISTICS.

205. United States Geological Survey. Mineral Resources for 1914, pt. 2, Nonmetals. Gives annual production of petroleum and asphalt in the West Indies.

## LEGAL REGULATIONS.

*See* No. 228.

## TRINIDAD.

### HISTORICAL REFERENCES AND OCCURRENCE.

206. Cadman, John. The development of the Trinidad oil fields. Jour. Inst. Petroleum Tech., vol. 1, pt. 3, 1915, pp. 99–116; discussion, pp. 116–126; Petroleum World, vol. 12, 1915, pp. 7–12. Describes exploration, development, and prospects of fields; securing of oil lands; difficulties and methods of drilling.

207. Forrest, C. W. Production of Trinidad and Bermudez Lake asphalts. Better Roads and Streets, vol. 5, no. 8, 1915, pp. 25–30, 46–47. Gives location, origin, and occurrence of asphalt deposits; mining methods, transportation, refining, and uses. Four kinds of bituminous road construction are also described.

208. Pearson, H. Early days in Trinidad. Petroleum World, vol. 12, 1915 pp. 19–21. Describes first attempts at drilling on modern lines, and success of American enterprise.

209. Petroleum World. Drilling in Trinidad fifty years ago. Vol. 12, 1915, pp. 451–452. Report of work done on Aripero estate 1866–67; gives drilling methods.

### GEOLOGY AND ORIGIN.

210. Richardson, C. A unique geophysical phenomenon, Trinidad asphalt, interesting from the point of view of dispersoid chemistry. Jour. Phys. Chem., vol. 19, 1915, pp. 241–249. Describes heavy petroleum rising from oil sands through a paste of colloidal clay and water, and emulsified therewith by violent action of escaping natural gas; emulsion of oil and colloidal material is converted after reaching surface into a solid asphalt.

### DEVELOPMENT AND PRODUCTION.

211. Engineering and Mining Journal. Mining Trinidad asphalt. Vol. 99, 1915, p. 483. Briefly describes method of mining and character of the asphalt.

212. Thompson, A. B. The development of Trinidad oil fields. Petroleum World, vol. 12, 1915, pp. 16–18. Describes operation and system of royalties; gives grades of oil, some with over 40 per cent of gasoline, some semisolid.

### TRANSPORTATION, STORAGE, AND DISTRIBUTION.

213. Petroleum Review. The transport and storage of petroleum in Trinidad. Vol. 33, 1915, p. 389. Explains new ordinance issued.

### UTILIZATION.

214. Richardson, C. Trinidad and Bermudez Lake asphalts and their use in highway construction. Philadelphia, 1915, 29 pp. Describes Trinidad pitch lake. Gives composition and analysis of the asphalt and characteristics of Trinidad petroleum. Compares Bermudez and Trinidad deposits.

### STATISTICS.

215. Petroleum World. List of oil fields worked in Trinidad, financial year 1913-14. Vol. 12, 1915, p. 34. Gives names of companies, location, owner and address, manager, and daily average number of persons employed.
*See also* No. 205.

### LEGAL REGULATIONS.

216. Petroleum World. Regulations made by Governor of Trinidad with reference to oil properties. Vol. 12, 1915, p. 397. Regulations for safety appliances and precautions against fire and accident.

## PORTO RICO.

### STATISTICS.

217. United States Bureau of Foreign and Domestic Commerce. Monthly summary of foreign commerce of the United States.

## SOUTH AMERICA.

### HISTORICAL REFERENCES AND OCCURRENCE.

218. Sociedad de Ingenieros del Peru. Conversaciones sobre contribución minera (Discussion of mineral resources). Informaciones y Memorias, December, 1915, p. 535. Discusses the mineral resources, including petroleum, in South America.

*See also* Nos. 200, 201, 202, 222.

### STATISTICS.

219. United States Geological Survey. Mineral Resources for 1914, pt. 2, Nonmetals. Gives production statistics of petroleum, natural gas, and asphalt.

### ARGENTINA.

#### HISTORICAL REFERENCES AND OCCURRENCE.

220. Hackett, G. A. The Argentina oil fields. Petroleum Rev., vol. 33, 1915, p. 165. Describes briefly topography and mineral products of Argentina; geology, typical wells, labor conditions, etc., of the Comodoro Rivadavia field.

221. Oil Age. Argentine oil operations. Vol. 11, July, 1915, pp. 21–23. Gives history and present status of operations in Comodoro Rivadavia field.

222. Velardez, J. El Petróleo del Comodoro Rivadavia (The petroleum of Comodoro Rivadavia). Inf. y Mem. Soc. Ing. Peru, December, 1915, p. 517. Describes production and conditions of the petroleum industry in Argentina and other parts of South America.

#### GEOLOGY AND ORIGIN.

223. Baclesse, H. Die argentischen Petroleumlager (The Argentina petroleum deposits). Prometheus, Jahrg. 27, 1915, pp. 121–122. Briefly describes oil fields and properties of oil.

224. Rasser, E. O. Das Petroleumvorkommen in Patagonien (The occurrence of petroleum in Patagonia). Prometheus, Jahrg. 27, 1915, pp. 169–171. Describes occurrence and characteristics of the oil.

225. Windhausen, A. Geologie der argentischen Petroleumlagerstätten nebst Bemerkungen zur Geschichte ihrer bisherigen Erforschung und Aufschliesung (Geology of Argentina petroleum deposits, with remarks on the history of their earlier investigation and opening). Petroleum Ztschr., Jahrg. 10, 1915, pp. 277–290. Address before the Argentine Society of German Engineers.

#### PROPERTIES AND THEIR DETERMINATION.

226. Rakuzin, M. A. Optical investigation of South Bolivian and Argentine naphthas. Jour. Russ. Phys. Chem. Soc., vol. 47, 1915, pp. 58–62. Naphtha shown to be semitransparent; tables give color, specific gravity, rotation, behavior, etc., of the different fractions.

#### STATISTICS.

227. Petroleum Age. Growing importance of Argentina fields. Vol. 2, 1915, pp. 11–12. Describes present condition of fields, productive wells, storage and transportation, and gives table of production for 1909 to 1915.

*See also* No. 219.

### LEGAL REGULATIONS.

228. Petroleum Zeitschrift. Die Verkehrs- und Handelsvorschriften für das Petroleum in den Einzelnen Ländern (Trade and commercial regulations for petroleum in special countries). Jahrg. 10, 1914-1915, pp. 64-66, 168-169, 246-248. Gives trade regulations for petroleum in Canada, Haiti, San Domingo, Chile, Uruguay, and Argentina.

## PERU.

### HISTORICAL REFERENCES AND OCCURRENCE.

229. Algeo, T. F. Peru produces 7,000 barrels daily. Oil and Gas Jour., vol. 14, Sept. 23, 1915, p. 31. Gives location of oil properties; describes activities of operators, field conditions, and effect of Government ownership.

230. Petroleum Age. Peru's oil fields hold great promise. Vol. 2, October, 1915, pp. 10, 12. Describes briefly fields and development, and effect of Government ownership of oil lands.

### GEOLOGY AND ORIGIN.

231. Duenas, E. Ensayo sobre la genesis probable de los petróleos y asfaltos del Perú (Proof of the probable origin of petroleum and asphalt in Peru). Peru, Cuerpo de Ing. de Minas, Bol., Mar. 31, 1915, pp. 27-34. Detailed study of Peruvian petroleum formations.

### STATISTICS.

232. Peru, Cuerpo de Ingenieros de Minas. Boletins. Contain statistics of oil production, drilling, etc.

## OTHER COUNTRIES.

### HISTORICAL REFERENCES AND OCCURRENCE.

233. Manning, I. A. Petroleum in Colombia. U. S. Commerce Reports, 1915, no. 286, Dec. 7, 1915, p. 937. Petroleum seepages heretofore unrecorded have been found in the districts bordering on the Magdalena River as far south as Girardot.

234. Petroleum Age. Oil prospects in Bolivia. Vol. 2, November, 1915, p. 13. Encouraging signs of oil were found in the Federal Perez district at 350 feet; favorable prospects for future development.

*See also* Nos. 207, 214.

### PROPERTIES AND THEIR DETERMINATION.

*See* No. 226.

### UTILIZATION.

235. Oil and Gas Journal. Fuel oil in Brazil. Vol. 14, Aug. 19, 1915, p. 24.

236. Petroleum Review. Oil fuel possibilities in Brazil. Vol. 33, 1915, pp. 311-312. Oil is supplied by English companies in Mexico and is used in textile industry and on Government railway engines.

### STATISTICS.

*See* No. 219.

### LEGAL REGULATIONS.

*See* No. 228.

# EUROPE.

## STATISTICS.

237. United States Geological Survey. Mineral Resources for 1914, pt. 2, Nonmetals. Gives production statistics of petroleum, natural gas, and asphalt.

## AUSTRIA-HUNGARY.

### HISTORICAL REFERENCES AND OCCURRENCE.

238. Herbing, —. Das naturgas in Siebenbürgen (Natural gas in Transylvania). Petroleum Ztschr., Jahrg. 10, 1915, pp. 689-693. Gives history of discovery and exploitation of natural gas. Discusses government ownership of the oil fields, oil production, future supply, composition, and uses of the gas.

239. International Verein der Bohringenieure und Bohrtechniker. Die Geschichte des galizischen Erdöles (History of Galician petroleum). Ztschr., Jahrg. 22, 1915, pp. 48–49. Shows quality of oil and development of fields.

240. Isser, M. Die Tiroler Asphaltschiefer-Vorkommen (The occurrence of asphalt shale in the Tirol). Petroleum Ztschr., Jahrg. 10, 1915, pp. 578–589; Montan Rundsch., Bd. 7, 1915, p. 267; Chem. Ztg., Rep., Jahrg. 39, 1915, p. 447. Describes occurrence of asphalt shale, gives history of industry, and use of asphalt for medicinal purposes.

### GEOLOGY AND ORIGIN.

241. Noth, J. Verbreitung der Erdölzone in den Karpathenländern und die Zukunft der Erdölgewinnung in denselben nach dem gegenwärtigen Kriege (Extent of petroleum deposits in the Carpathian fields and future production after the present war). Ztschr. Intern. Ver. Bohring, Jahrg. 22, 1915, pp. 93–95, 117–120, 125–129, 135–139, 145–147, 153–156, 161–165, 171–174, 181–185, 191–194.

242. Schubert, R. Zur Frage der Petroleumvorkommen in Südostmähren in Zusammenhange mit den Mineralquellen (Question of petroleum occurrence in southeastern Moravia in connection with mineral sources). Petroleum Ztschr., Jahrg. 10, 1915, pp. 481–483. Discusses probability of finding petroleum where there are sulphur springs, sandstone formations, and dark gray shales.

### DEVELOPMENT AND PRODUCTION.

243. Dunaj, K. Die Erdölindustrie in Galizien (The petroleum industry in Galicia). Glückauf, Jahrg. 51, 1915, pp. 659–664. Reviews oil industry in Galicia, including drilling and producing methods.

244. Steiner, L. Die Vorteile des elektrischen Antriebes im galizischen Erdölgebiet (The advantages of electrical power in the Galician petroleum fields). Petroleum Ztschr., Jahrg. 11, 1915, pp. 63–65; discussion, p. 163. Compares use of electrical and steam power.

### REFINING AND REFINERIES.

245. Seelenfried, L. European refining methods. West. Eng., vol. 6, 1915, pp. 247-248. Paper read before American Petroleum Society, San Francisco, Oct. 1915. Describes refining methods of Austria-Hungary and Roumania, and distillation process.

### STATISTICS.

246. Hanel, R. Jahrbuch der österreichischen chemischen Industrie (Yearbook of the Austrian chemical industry). 1915. Contains statistics on petroleum, tar, etc.
*See also* No. 237.

## GERMANY.

### HISTORICAL REFERENCES AND OCCURRENCE.

247. Schultz, E. The petroleum industry in Alsace and the use of lubricants of Pechelbronn asphalt in 1860. Mat. grasses, t. 8, 1915, pp. 4267–4268. Gives historical review of the industry.

### DEVELOPMENT AND PRODUCTION.

248. Roschanski, D. Eigenschaften der Schwengel- und Kehrradantriebe im Oelgewinnungsbetriebe Wietze bei Hannover (Comparison of lever and rotary pumps used at Wietze, near Hannover, for producing oil). Petroleum Ztschr., Jahrg. 10, 1915, pp. 325–327. Discusses relative advantages of both kinds of pumps.

249. ——— Ueber die Arbeitsweise der kanadischen Pumpen und die mit denselben augestellten Versuche und Beobachtungen im hannoversehen Erdölbetriebe (Concerning the workings of Canadian pumps and experiments with them and observations in the Hannoverian oil fields). Petroleum Ztschr., Jahrg. 11, 1915, pp. 253–257; discussion, pp. 330–331.

### TRANSPORTATION, STORAGE, AND DISTRIBUTION.

250. Petroleum World. How Berlin stores its motor spirit. Vol. 12, 1915, pp. 99–101. Describes modern plant and power station and methods of filling and emptying the storage tanks.

## GREAT BRITAIN.

### STATISTICS.

Imports Into the United Kingdom.

251. Great Britain, Mines and Quarries. General report, with statistics, for 1914 (annual), by chief inspector of mines; pt. 3, Output. Gives statistics by countries.

252. Petroleum Review. Weekly report classifies imports by countries.

Production of Petroleum.

253. Great Britain, Mines and Quarries. General report, with statistics, for 1914 (annual), by chief inspector of mines; pt. 4, Colonial and foreign statistics. Gives production statistics for all British colonies.

254. Petroleum Review. Petroleum trade of England during 1914. Vol. 32, 1915, pp. 51–52. Statistics given of imports into London, Bristol, Manchester, Liverpool, Hull, and Barrow.

Production of Shale in Scotland.

255. Great Britain, Mines and Quarries. General report, with statistics, for 1914 (annual), by chief inspector of mines; pt. 3, Output. Gives statistics of oil-shale industry in Scotland.

## ROUMANIA.

### DEVELOPMENT AND PRODUCTION.

256. Forbin, V. L'industrie pétrolifère en Roumanie (Petroleum industry in Roumania). La Nature, vol. 43, 1915, pp. 7–11. Briefly reviews industry and explains drilling and producing methods.

257. Oil and Gas Journal. Roumanian field conditions as seen by American oil men. Vol. 14, Sept. 30, 1915, p. 31. Brief review of field conditions, drilling systems and labor problems.

258. Petroleum Review. The exploitation of the Meotien formation in Roumania. Vol. 33, 1915, p. 447. States that worth of region has been proved by good results recently obtained.

259. Steiner, L. Neue Vorschriften bezüglich der Verwendung der Elektrizität in rumänischen Rohölgebiet. (New regulations regarding use of electricity in the Roumanian oil fields). Reviewed in Petroleum Ztschr., Jahrg. 10, 1915, pp. 693–694. Discusses effective regulations for installation of electrical motors.

### TRANSPORTATION, STORAGE, AND DISTRIBUTION.

260. International Verein der Bohringenieure und Bohrtechniker. The Roumanian pipe lines. Ztschr., Jahrg. 22, 1915, pp. 85–86. Describes systems of pipe lines.

### PROPERTIES AND THEIR DETERMINATION.

261. Nicolesco-Ottin, C. Chemical-technical investigation of the Matitza asphalt. Ann. sci. Univ. Jassy, t. 9, 1915, pp. 138–168; Chem. Zentralb., Bd. 2, 1915, p. 504; Chem. Abs., vol. 10, 1916, pp. 524–525. Describes the physical properties and chemical composition of the asphalt, and gives in detail the results of analyses and tests.

### REFINING METHODS.

*See* No. 245.

### STATISTICS.

Field Development.

262. Petroleum World. Monthly report gives statistics of drilling, producing, and abandoned wells, with initial production.

*See also* No. 237.

Prices of Petroleum.

263. Petroleum Review. Home and foreign market intelligence. Weekly reports giving prices.

Production of Crude and Refined Petroleum.

264. Petroleum World. Monthly reports give refinery statistics and tons of crude used.

## RUSSIA.

### HISTORICAL REFERENCES AND OCCURRENCE.

265. Calder, W. The Maikop oil field, South Russia. Trans. Inst. Min. Eng., London, vol. 48, 1914–1915, pp. 321–337; discussion, pp. 338–347. Describes geologic and geographic conditions, methods of drilling and production; presents well logs and illustrations.

266. Kalitzki, F. The Ferghana petroleum deposits. Reviewed in Petroleum Rev., vol. 33, 1915, p. 37. Describes geographic and geologic distribution of oil.

267. Stukatcheff, V. The Uchta petroliferous areas. Reviewed in Petroleum Rev., vol. 32, 1915, p. 268. Gives geographic and geologic description of district; history of State exploration and results of investigations.

### GEOLOGY AND ORIGIN.

268. Gubkin, I. M. Geological investigations of the Taman Peninsula. Petroleum Rev., vol. 32, 1915, p. 355. Geologic structure of peninsula and petroleum indications are described.

269. Kalitzki, K. The Boia-Dag petroliferous deposits. Petroleum Rev., vol. 32, 1915, p. 117. Geologic description of the field.

270. ——— The Tchikishliar gas fields, Turkestan, Russia. Petroleum Rev., vol. 33, 1915, p. 289. Describes volcano lakes formed by activity of spouted gas, and "Boiling Hill," from which gas escapes in large quantities. Evidence of petroleum deposits is strong.

271. Latkin, V. The Ural petroliferous deposits. Petroleum Rev., vol. 32, 1915, pp. 75–76, 95–96. Describes drainage, exploration, and geology of Dos-Sar region; lists companies and gives statistics of drilling and production.

*See also* Nos. 265, 266, 267.

## DEVELOPMENT AND PRODUCTION.

272. Deen, M. J. Suggestions for oil-drilling in Russia. Petroleum Rev., vol. 32, 1915, pp. 547–549. Discusses faults of different boring systems used in Russia; suggests changes in drilling methods in Baku and Grosny.

273. Petroleum Review. The filling in of Bebe-Eibat Bay, for oil exploitation. Vol. 33, 1915, p. 489. Area is divided into plots distributed among producers, who are to pay expenses and be repaid in tax of new production.

274. ——— The Kalujski oil fields, Kuban Province, Russia. Vol. 33, 1915, p. 289. Exploitation was begun in 1914; conditions are favorable and oil is of good quality; storage facilities are inadequate; pipe line to be constructed.

275. Petroleum World. Greatest gusher in the old world. Vol. 12, 1915, p. 180. Describes well yielding 8,000 tons daily in the Maikop field.

276. Walker, C. J. Russian oil fields (Baku). Oil and Gas Man's Mag., vol. 10, 1915, pp. 3–7. Describes drilling of well by American rotary method; system of leasing, and drilling regulations.

277. ——— Russian oil fields (Baku). Oil and Gas Man's Mag., vol. 10, 1915, pp. 59–61. Describes briefly oil field; discusses recovery of oil by compressed air or bailing; separation of sand from oil when stored in sump holes; and properties of the oil.

## PROPERTIES AND THEIR DETERMINATION.

278. Petroleum Review. Toluol from Baku petroleum. Vol. 33, 1915, p. 229. Discusses possibilities of obtaining anthracene, benzol, naphthalene, pitch, toluol, and xylol.

*See also* Nos. 1382, 1385.

279. Pyhälä, E. Zur Kenntnis der hochmolekularen Naphthensäuren des Bakuer Erdöls (Study of naphthenic acids of high molecular weight in Baku petroleum). Ztschr. angew. Chem., Jahrg. 27, 1915, I, p. 407; Petroleum Ztschr., Jahrg. 10, 1915, p. 334. Describes tests in which naphthenic acids in waste lyes from the refining of Baku oils were extracted and purified.

## UTILIZATION.

280. Petroleum World. Diesel engine building in Russia. Vol. 12, 1915, pp, 254–256. Describes results of tests of a 600 boiler-horsepower engine.

## STATISTICS.

Exports.

281. Petroleum World. Monthly statement gives exports from Baku, by kinds of oil and routes, in poods.

Field Development.

282. Board of Trade and Engineering Journal. The mineral oil industry of the Caucasus. June 17, 1915. Reviews 1914 developments.

283. Petroleum World. Monthly statement gives condition and description of wells in Baku and Surakhany.

*See also* No. 237.

PRICES.

284. Petroleum Review. Home and foreign market intelligence. Weekly report gives prices of Russian oil.

PRODUCTION OF PETROLEUM AND NATURAL GAS.

285. Petroleum World. Monthly statement of production in Surakhany and Baku.

## TURKEY.

### GEOLOGY AND ORIGIN.

286. FRECH, F. Mineralvorkommen Anatoliens (Mineral occurrences in Anatolia). Glückauf, Jahrg. 51, 1915, pp. 464–470. Gives geologic occurrence of asphalt and oil.

## OTHER COUNTRIES.

### OCCURRENCE.

287. GALDI, B. The petroleum of S. Giovanni Incarico. Ind. chim. min. e met., t. 2, 1915, pp. 187–194. Describes the region.

288. OTLET, R. Explotación de las minas de asfalto de Fuentetoba-Cidones (Working of the asphalt mines of Fuentetoba-Cidones). Revista Minera, vol. 66, 1915, p. 51. Gives location of deposit, geologic formation, analysis, commercial value, and prospects of asphalt industry.

289. PETROLEUM REVIEW. Petroleum in Spain. Vol. 32, 1915, p. 294. Discusses favorable conditions for petroleum; Government encourages deep drilling.

### PROPERTIES AND THEIR DETERMINATION.

290. DEMESSE, J., AND RÉAUBOURG, G. Sulphur-containing oil from the Kimmeridge shale of Saint-Champ (France). Bull. soc. Pharmacol., vol. 22, 1915, pp. 28–31; Jour. Soc. Chem. Ind., vol. 35, 1916, p. 103. Discusses composition, and antiseptic and therapeutic properties, which are increased by sulphonation.

291. PONTE, G. Gli scisti bituminosi della Sicilia e la loro importanza industriale (The bituminous schists of Sicily and their industrial importance). Ind. chim. min. e met., t. 2, 1915, pp. 31–34. States that deposits occur in Messina and are easily accessible without great cost.

*See also* No. 665.

### REFINING AND REFINERIES.

292. PULLE, G. The industry of the bituminous schists of Italy. Ind. chim. min e met., t. 2, 1915, pp. 207–219. An account of bituminous industry in Italy; describes separation and distillation.

### STATISTICS.

PRODUCTION OF PETROLEUM AND ASPHALT.

293. Rivista del Servizio Minerario. Gives annual statistics for Italy.

*See also* No. 237.

# ASIA.

## STATISTICS.

PRODUCTION OF PETROLEUM, NATURAL GAS, AND ASPHALT.

**294.** United States Geological Survey. Mineral Resources for 1914, pt. 2, Nonmetals. Gives annual statistics.

## CHINA.

### OCCURRENCE.

**295.** MINING AND SCIENTIFIC PRESS. Oil in China. Vol. 111, 1915, p. 248. Discusses prospects in Provinces of Shensi and Shansi.

### DEVELOPMENT AND PRODUCTION.

**296.** POMEROY, A. G. Oil, gas, and brine wells in China. Petroleum Rev., vol. 32, 1915, pp. 39–40. Ancient drilling methods are described.

## INDIA.

### OCCURRENCE.

**297.** INDIA, RECORDS OF GEOLOGICAL SURVEY. Occurrence of petroleum in India. Vol. 46, 1915, pp. 193–197.

### GEOLOGY AND ORIGIN.

**298.** BLEECK, A. W. G. Contributions to the economic geology and the results of petroleum borings on the Minbu oil field, India. Trans. Min. and Geol. Inst., India, March, 1915, p. 61. The land covered has been surveyed and laid off in sections of one square mile.

**299.** PORRO, C. Geology of the country near Ngahlaingdwin, Minbu district in Burma. Records Geol. Survey, India, vol. 45, pt. 4, 1915, pp. 249–270. Geologic description given; seepages and possibility of oil in different localities are discussed.

### UTILIZATION.

**300.** PETROLEUM WORLD. Oil engines in India. Vol. 12, 1915, p. 149. Types used are discussed; Indian crude oil or liquid fuel is black, viscous, and heavy, with specific gravity averaging 0.900 at 88° F.

### STATISTICS.

IMPORTS.

**301.** India, Records of Geological Survey. Gives annual statistics of petroleum imports.

PRODUCTION OF PETROLEUM.

**302.** Great Britain, Mines and Quarries. General report, with statistics, for 1914 (annual), by chief inspector of mines; pt. 4, Colonial and foreign statistics.

*See also* No. 294.

## JAPAN.

### OCCURRENCE.

303. Japan, Bureau of Mines. Mining industry in Japan, prepared for the World's Panama Pacific Exposition, San Francisco, Cal., 1915, 80 pp. Mineral resources of Japan are given.

### PROPERTIES AND THEIR DETERMINATION.

304. Kyotoku Fugi. Radium emanation in petroleum from Nisiyama oil field in the province of Etigo. Proc. Tokyo Math.-Phys. Soc., vol. 8, 1915, pp. 13–14. Gives values of 166 and $114 \times 10^{-12}$ curie per liter.

### STATISTICS.

*See* No. 294.

# AFRICA.

## HISTORICAL REFERENCES AND OCCURRENCE.

305. Oil and Gas Journal. Information about oil in Egypt. Vol. 14, June 17, 1915, p. 31. Reviews paper read before Cairo Scientific Society on occurrence of oil in Egypt.

## GEOLOGY AND ORIGIN.

306. Graefe, E. Die Bitumenlager von Sidi Messaoud in Algier (The bitumen deposits of Sidi Messaoud in Algiers). Petroleum Ztschr., Jahrg. 10, 1915, pp. 641-645. Describes bitumen industry.

307. Mills-Davies, J. E. Oil prospects in Portuguese East Africa. South African Min. Jour., Sept. 11, 18, 1915. Discusses the Cretaceous formation and coastal development.

308. Petroleum Review. The distribution of petroleum deposits in Egypt. Vol. 32, 1915, p. 396. Résumé of paper by Hume before Scientific Society at Cairo. Discusses surface indications and geologic formation; describes first gusher in 1908.

## STATISTICS.

309. Board of Trade Journal. Mineral oil production in the Red Sea fields in 1914. May 6, 1915, p. 401. Reviews development and gives table of production of refined products.

## LEGAL REGULATIONS, ETC.

310. Wade, Arthur. Report on petroleum in Papua. Melbourne, 1915, pp. 41–43. Contains rules and regulations as to mining petroleum in Egypt; includes regulations regarding surface rights, applications to erect structures, keeping of records, etc.

# OCEANIA AND MALAYSIA.

## STATISTICS.

PRODUCTION OF PETROLEUM AND ASPHALT.

311. United States Geological Survey. Mineral Resources for 1914, pt. 2, Nonmetals. Give statistics of principal producing localities.

## AUSTRALIA.

### GEOLOGY AND ORIGIN.

312. BASEDOW, H. Oil in South Australia. Petroleum Rev., vol. 32, 1915, pp. 307–8. Shows geological structure; indications for oil are good, but drilling never deep enough; bitumen specimens on beaches indicate existence of asphalt and ozocerite.

313. CAMERON, W. E. Boring for oil at Roma. Queensland Govt. Min. Jour., vol. 16, 1915, pp. 552–553. Report on site for first test bore; discusses possibilities for oil.

314. CAMERON, W. E., AND OTHERS. Petroleum and natural gas prospects at Roma. Pub. 247, Queensland Geol. Survey, 1915, 91 pp., il. Historical review of prospecting and boring at Roma.

315. DAY, D. T. Boring for oil at Roma. Queensland Govt. Min. Jour., vol 16, 1915, pp. 508–509. Report upon data on oil and gas prospects at Roma.

316. TWELVETREES, W. H. Reconnaissance of country between Recherche Bay and New River, Southern Tasmania. Bull 24, Tasmania Geol. Survey, 1915, 38 pp. Gives account of discoveries and occurrences of asphalt and petroleum; discusses sources of asphaltum and geologic structure of field.

317. WADE, A. The supposed oil-bearing areas of South Australia. Bull. 4, South Australia Geol. Survey, 1915. Describes geologic conditions and discusses occurrence of petroleum; possibilities of a commercial petroleum slight.

318. WOODWARD, H. P. The reputed petroliferous area of the Warren River district. Bull. 65, West Australia Geol. Survey, 1915, 54 pp. Concludes that district has little possibility of producing petroleum.

319. IMPERIAL INSTITUTE OF UNITED KINGDOM. Petroleum in Papua. Bull., vol. 13, 1915, pp. 185–189. Discusses physical properties and burning qualities of the oil.

### STATISTICS.

*See* No. 311.

## BORNEO, JAVA, AND SUMATRA.

### STATISTICS.

*See* No. 311.

## NEW GUINEA (PAPUA).

### HISTORICAL REFERENCES AND OCCURRENCE.

320. PETROLEUM WORLD. Petroleum in Papua, 1911 to 1915. Vol. 12, 1915, pp. 394–396. Historical review of developments; analysis shows valuable type of oil.

321. Wade, A. Petroleum in Papua. Report to the Australian Government. Melbourne, 1915, 48 pp. Reviewed in Petroleum World, vol. 12, 1915, pp. 197–201, 283–286; Petroleum Rev., vol. 32, 1915, pp. 395–396. Describes general conditions, oil indications, difficulties in developing, and suggests lines of development; Government exploitation recommended.

### STATISTICS.

*See* No. 311.

## NEW ZEALAND.

### OCCURRENCE.

322. New Zealand Geological Survey Branch. Eighth annual report. 2nd ed., 1915, 170 pp. Contains account of oil resources and prospects.

### STATISTICS.

*See* No. 311.

## PHILIPPINE ISLANDS.

### OCCURRENCE—GEOLOGY.

323. Boomer, J. F. Asphalt and petroleum in the Philippines. U. S. Commerce Reports, No. 170, 1915, pp. 358–361; Petroleum Rev., vol. 33, 1915, pp. 197–198, 437–438. Large quantities of rock asphalt and some petroleum are found. The petroleum has a high percentage of gasoline.

324. Chamber of Commerce Journal. Asphalt from the Philippines. Vol. 34, March, 1915, p. 96. Describes gilsonite; deposit in Leyte and nearby seepage of heavy oil; analysis and properties of gilsonite are given.

325. Pratt, W. E. The occurrence of petroleum in the province of Cebu. Philippine Jour. Sci., vol. 10, A, 1915, pp. 281–286. Shows yield of gasoline to be 6.2 per cent, kerosene 42.32 per cent, heavy oils 38.3 per cent, and residue 13.17 per cent.

326. ——— Petroleum and residual bitumens in Leyte. Philippine Jour. Sci., vol. 10, A, 1915, pp. 241–278. The crude oil yields 8.14 per cent of paraffin scale, 5.4 per cent of gasoline, 33.7 per cent of kerosene, 55.3 per cent of heavy oils, and 5.6 per cent of residual pitch. Analyses of bitumens are also given. Describes geology of oil and asphalt bearing rocks and strata.

### PROPERTIES AND THEIR DETERMINATION.

327. Boomer, J. F. Rock asphalt in Philippines. Commerce Reports, No. 193, U. S. Bureau of Foreign and Domestic Commerce, 1915, p. 856. Discusses the results of analyses of bituminous rock in Leyte and its possibilities for use as paving material and as a source of petroleum products.

### STATISTICS.

328. Imports of Petroleum. United States Bureau of Foreign and Domestic Commerce. Monthly summary of foreign commerce of United States. Gives quantity and value of crude and refined mineral oils exported to the Philippine Islands.

## TIMOR.

### HISTORICAL REFERENCE AND OCCURRENCE.

329. Sociedad de Geografia de Lisboa. Provincia de Timor (Province of Timor). 1915, 216 pp. Gives an account of petroleum found in the district.

# GEOLOGY AND ORIGIN.

## GENERAL GEOLOGY.

330. Hager, D. Practical oil geology. New York, 1915, 141 pp. Discusses origin, physical and chemical properties of oil; geology of oil fields; prospecting and mapping; locating drill-hole sites; factors in oil-well drilling and production.
*See also* General treatises.

## GEOLOGIC STRUCTURE.

331. Johnson, R. H. A proposed classification of the attitude of geologic surfaces. Science, vol. 42, 1915, pp. 450–452. Mere classification of folds not adequate in oil and gas geology; proposed classification explained.

## ORIGIN, THEORIES.

332. Mabery, C. F. The origin of petroleum. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 664–665. Experiments are being made on the action of sulphur on constituents of petroleum. Nitrogen compounds other than pyridine are present in many crude oils.

332a. Washburne, C. W. Chlorides in oil-field waters. Bull. Am. Inst. Min. Eng., April, 1915, pp. 825-830: Trans., vol. 50, 1915, pp. 883–889. Reply to discussion of paper by author. Discusses occurrence of chloride waters.

### INORGANIC.

333. Canadian Mining Journal. Origin of natural gas and petroleum. Vol. 36, 1915, pp. 425–426. Account of discussion of inorganic origin of gas and petroleum at Canadian Institute of Mining Engineers.

334. Chichibabin, A. E. Causes of formation of natural naphtha. Jour. Russ. Phys. Chem. Soc., vol. 47, 1915, pp. 714–716. Discusses hypothesis of the mineral origin of naphtha.

335. Concha, A. Teoría sobre el origin del petróleo: usos del petrólea y sus ventajas (Theory of the origin of petroleum; the uses of petroleum and its advantages). Revista Minera Met. Ing., vol. 66, 1915, pp. 429–432, 441–445. Concludes that petroleum is of inorganic origin. Discusses its use on ships, railroads, etc.

### ORGANIC.

336. Chautard, J. Le problème de l'origine des pétroles (The problem of the origin of petroleum). Bull. Soc. l'ind. min., July–Sept., 1915, pp. 111–145. Geologic study of oil deposits; concludes that petroleum originates in decomposition of organic matter, etc.

336a. Davis, C. A. The algal flora of some Eocene oil shales. Abstracted in Science, new ser., vol. 41, 1915, p. 879.

336b. ——— On the fossil algæ of the petroleum-yielding shales of the Green River formation. Abstracted in Science, new ser., vol. 41, 1915, p. 570..

337. Donath, E. Genesis des Erdöls (Origin of petroleum). Petroleum Ztschr., Jahrg. 11, 1915, pp. 209–215. Gives further proof of organic origin of petroleum by a study of the "fish-shales" and oils of Raibl, Austria.

338. JOHNSON, R. H. The relation of the quality of oil to deformation. Econ. Geol., vol. 10, 1915, pp. 676–678. Discusses paper on origin and relations between coal and petroleum.

339. WHITE, DAVID. Regional alteration of oil shales. Abstracted in Bull. Geol. Soc. Am., vol. 26, 1915, pp. 101–102. Paper read before Geological Society of America. A study of oil rocks, such as cannels or bituminous shales.

340. ——— Some relations in origin between coal and petroleum. Jour. Wash. Acad. Sci., vol. 5, 1915, pp. 189–212; discussion, by R. H. Johnson, in Econ. Geol., vol. 10, 1915, pp. 676–678.

## ACCUMULATION.

341. BURRELL, G. A. The conditions of natural gas in the earth's strata. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 322–324. Concludes that natural gas used at Pittsburgh, Pa., does not occur as liquid in the earth's strata.

342. HENDERSON, J. A. L., AND HENDERSON, W. H. Inflammable natural gas as an economic mineral. Petroleum Rev., vol. 32, 1915, pp. 103–104, 135–136, 183–184, 215–216, 228. Paper read before the Institution of Mining and Metallurgy, January, 1915. Reviews natural gas industry, chiefly in the United States; properties of casing-head gas.

343. JOHNSON, R. H. The rôle and fate of connate water in oil and gas sands. Bull. Am. Inst. Min. Eng., February, 1915, pp. 221–226; discussion, May, 1915, pp. 1157–1162, July, 1915, pp. 1449–1459, September, 1915, pp. 2057–2060. Conclusions are that with depth an increase of gas is found and a decreased quantity of oil finds its way into the larger pores. If this hypothesis holds true, much of the world's oil is lost to recovery.

343a. JOHNSON, R. H., AND OTHERS. The capillary concentration of gas and oil. Bull. Am. Inst. Min. Eng., April, 1915, pp. 831–846; May, 1915, pp. 1203–1204. Discussion of paper of C. W. Washburne.

344. PEPPERBERG, L. J. The accumulation of petroleum near the outcrop of oil sands. West. Eng., vol. 5, 1915, pp. 463–465. Discusses results when asphaltum is in oil near outcrop; special reference to conditions in Wyoming oil fields is made.

## APPLIED GEOLOGY.

345. HAGER, DORSEY. Dry holes and their lesson. Oil and Gas Jour., vol. 13, May 27, 1915, p. 30. Describes causes of failure to find oil, such as improper location of holes and insufficient drilling.

346. ——— Geologic conditions that may confuse oil drillers. Eng. and Min. Jour., vol. 100, 1915, p. 590. Discusses factors making oil-field work uncertain, such as faults, unconformities, lensing, lack of porosity, basalt intrusions, etc.

347. ——— The manner of selecting land for oil property. Oil and Gas Jour., vol. 13, Mar. 25, 1915, p. 27. Explains three systems of acquiring lands now in use, the block, checkerboard, and geological.

348. REESER, H. C. Natural gas; its production, transportation, and distribution. Oil and Gas Man's Mag., vol. 10, 1915, pp. 151–165. Discusses uncertainty in locating gas; system of leases and royalties; cost of well drilling; pipe-line transportation.

349. WELLS, J. A new method of indicating the geology of an oil field. Petroleum World, vol. 12, 1915 pp. 494–496. Describes method and explains advantages of section sheets and standards of transparent celluloid.

*See also* Nos. 465, 466.

# DEVELOPMENT AND PRODUCTION (OIL AND GAS).

## GENERAL TREATISES.

350. Petroleum Zeitschrift. Neuerungen auf dem Gebiete der Gewinnung und Verarbeitung von Erdölprodukten (New methods for recovery and preparation of petroleum products). Jahrg. 10, 1915, pp. 648–651, 901–905. Reviews patents and processes for obtaining and treating petroleum.

351. Westcott, H. P. Handbook of natural gas. Erie, Pa., Metric Metal Works, 2nd ed., 1915, 606 pp. Gives information on high and low pressure construction in use of natural gas; contains suggestions for field work.

## DRILLING (METHODS, TOOLS, AND EQUIPMENT).

352. Barnes, G. W. Economical construction and operation of a natural gas plant. Proc. Nat. Gas Assoc. of Am., vol. 7, 1915, pp. 387–402; discussion, pp. 402–411. Discusses economic principles as applied to production, field lines, transportation, and operation.

353. McMahon, J. L. The drilling of an oil well. Texaco Star, vol. 2, September, 1915, pp. 6–14. An illustrated explanation of drilling process.

354. Woodworth, R. B. The evolution of drilling rigs. Bull. Am. Inst. Min. Eng., November, 1915, pp. 2247–2312; discussion, May, 1916, pp. 953–959. Discusses development of application of steel to construction of drilling machinery, from a structural engineer's standpoint.

### DRILLING METHODS.

355. Calder, W. Oil-well engineering. Jour. Inst. Petroleum Tech., vol. 1, pt. 4, 1915, pp. 228–262; discussion, pp. 262–279; Petroleum Rev., vol. 32, 1915, pp. 414, 435–436. Deep-well drilling an important branch of mining engineering; well-drilling systems are described.

356. Canadian Engineer. Methods of boring and drilling on oil fields. Vol. 29, 1915, pp. 158–159. Describes various systems, including the Pennsylvania cable, Canadian pole, Russian free fall, and modern hydraulic rotary drill.

357. Dvorkovitz, P. Boring and drilling on the oil fields. Trans. Inst. Min. Eng., London, vol. 48, 1914–1915; Petroleum Rev., vol. 32, 1915, pp. 507–508, 527–528; vol. 33, 1915, pp. 25–26, 66. Progress in drilling methods, including the Pennsylvania cable, Canadian pole, Russian free fall, and the rotary.

#### PATENT.

358. Beecher, T. A. Method for locating liquid strata in a well. U. S. patent 1133218. 1915. A known substance is distributed in the well, water forced in, and samples of water taken at various depths to ascertain if they contain the substance.

#### ROTARY.

*See* Nos. 357, 391.

## DRILLING TOOLS.

### PATENTS.

359. Bardeen, H. A. Well tool. U. S. patent 1132062. 1915. Has a sliding head that expands and retracts a pair of cutters.

360. Boardman, H. L. Casing spear. U. S. patent 1150095. 1915. Has a tapered part with a spiral groove, on which is mounted several chocks.

361. Dunham, C. L. Pipe tongs. U. S. patent 1158656. 1915. Has a cam pivoted on the gripping jaw to prevent slipping.

362. Graham, A. C. Well casing perforator. U. S. patent 1162601. 1915. Has perforating wheels operated by movable links.

363. Guise, J. J. Casing spear. U. S. patent 1144592. 1915. Has a tapering shank on which sliding wedges are mounted.

364. Jack, W. Y. Well casing spear. U. S. patent 1155926. 1915. Head has dogs so mounted in grooves that they may be expanded to grip the casing.

365. Kibele, E., and Vreeland, W. G. Pipe and casing tongs. U. S. patent 1129299. 1915. A wrench having cam surfaces on the movable jaw and two pins so arranged that the action of the wrench may be reversed by changing the pins from one set of holes to another.

366. Roby, J. W. Drill bit clutch. U. S. patent 1142460. 1915. A casing with a grooved coupling on the lower end, and a bit clutch with pawls engaging the grooves.

367. Schildwachter, W. Drill rod tap. U. S. patent 1163561. 1915. A device for cutting threads on a broken drill rod in a well.

*See also* Nos. 450, 486.

### PERCUSSION—PATENTS.

368. Beckert, E. R. Underreamer. U. S. patent 1139096. 1915. Has a chambered mandrel containing a pair of bits that can be expanded outwardly.

369. De Bretteville, A. Well-drilling implement. U. S. patent 1138188. 1915. Has an expansible bit.

370. Calhoun, A. S. Drill jar. U. S. patent 1154483, 1915. A tubular stock with lateral vents and a hole in the upper end through which a mandrel with an enlarged tip operates, the mandrel being shorter than the stock, so that if the mandrel should break the opening will be automatically cleared of the broken part.

371. Cleveland, E. L. Drill jar. U. S. patent 1144814. 1915. A tool stem having a cavity containing a jarring head suspended by a short cable connected at its upper end to a sliding drill-rope socket.

372. Conley, M. Drill extractor. U. S. patent 1133709. 1915. A tapering bar with a head on the lower end passes up through a collar which is clamped on the head and has a slot adapted to slip over the end of the drill, a clamp prevents it slipping off the drill.

373. Craven, J. F. Well drill jar. U. S. patent 1133841. 1915. Has two interlocking links, each formed of a cylinder split lengthwise to form reins, the reins of one sliding in the grooves of the other. The split ends of each link are held in place by a collar, the other end being provided with a threaded shank.

374. Davis, J. W. Tool for drawing casings from wells. U. S. patent 1145125. 1915. A tapering shank on which sliding blocks are mounted is bored to admit a rod having a T head on the lower end. The rod when raised supports the blocks. A spring catch prevents the rod from slipping down when once raised.

375. Griffin, T. J. Underreamer. U. S. patent 1131928. 1915. A mandrel having slotted sides in which expansible bits are mounted.

376. Haugh, F. A. Underreamer. U. S. patent 1144195. 1915. Has an expanding head between the bits for holding them in cutting position.

377. ——— Underreamer. U. S. patent 1149512. 1915. The lower end of an adjustable plunger is provided with an expanding head for wedging the cutting blades in position.

378. Henderson, C. W. Fishing tool. U. S. patent 1156289. 1915. A fishing tool of tapered bore having a jarring device connected to a cable for jerking the tool up and down; an auxiliary cable exerts a constant pull on the tool.

379. Howard, A. A. Ratchet swivel for drilling cables. U. S. patent 1150196. 1915. Swivel rod is operated by means of a ratchet and pawl.

380. Kammerdiner, J. Drilling apparatus. U. S. patent 1128326. 1915. A case with a stuffing box at the lower end, and a T fitting at the upper end attached to a pipe through which fluid is forced under pressure to operate the drilling mechanism.

381. Kerns, F. T. Oil-saving device for oil wells. U. S. patent 1159230. 1915. A hinged clamp for attaching tubing or casing.

382. Lego, J. C. Underreamer. U. S. patent 1133481. 1915. Bits are forced outward by a sliding block, which is locked in position by means of a dog.

383. Lorenz, J. Underreamer. U. S. patent 1136543. 1915. Bits are expanded by means of a set of dogs and triggers.

384. Mapes, C. T. Underreamer. U. S. patent 1165196. 1915. Bits are expanded by means of a pair of slips that expand when elevated and contract when lowered.

385. Nickolai, C. L. Double underreamer setter. U. S. patent 1157577. 1915. Comprises a U-shaped frame having notches in the ends of its arms, and a stem having a threaded upper end and threaded through a nut swiveled in the base bar of the frame.

386. Pippin, J. W. Underreamer. U. S. patent 1133398. 1915. A latch, held closed by the casing, presses down the rod bearing the bits and keeps them in closed position. When the latch passes from the casing it releases the rod, which is forced up by a spring and expands the bits.

387. Rigby, C. F. Clamp for well-drilling cables. U. S. patent 1159096. 1915. A clamp for connecting a large cable and a smaller one.

388. Shaffer, E. E. Horn socket for oil and gas wells. U. S. patent 1166010. 1915. A socket adapted to receive the shank of a tool socket, with catches arranged to be tripped by the shank and hold it.

389. Wagner, W. Underreamer. U. S. patent 1149799. 1915. Bits are held in mandrel by bayonet slots in mandrel and lugs on bits, and are expanded by means of a key.

### ROTARY.

390. Fuel Oil Journal. The use of special bits for rotary well drilling. Vol. 6, June, 1915, pp. 32–35. Describes several kinds of Hughes bits.

391. Hughes, H. R. A modern rotary drill. Bull. Am. Inst. Min. Eng., March, 1915, pp. 631–635; discussion, May, 1915, p. 1162. Comparative costs of drilling with fish-tail and Hughes bits are given.

### PATENTS.

392. Bardeen, H. A. Fish-tail bit. U. S. patent 1136203. 1915. A fish-tail bit having toothed revolving cutters.

393. Black, L. J. Rotary drilling apparatus. U. S. patent 1144098. 1915. Jaws are operated by means of a rotary scroll plate.

394. Bloss, W. H. Drill. U. S. patent 1162441. 1915. Has curved cutting blades so beveled that they tend to spread in boring, the spreading being controlled by the end of the casing.

395. Buick, D. D. Well-boring tool. U. S. patent 1159172. 1915. The under-reaming blades, which are pivotally mounted on a vertical blade, expand when the latter is lowered beyond the casing.

396. Decker, H. R. Drill. U. S. patent 1152151. 1915. Has rotary cutting wheels.

397. Hockabout, W. R. Drill. U. S. patent 1154636. 1915. Elliptical drill shank with two V-shaped grooves along the shorter axis.

398. Hughes, H. R. Rotary boring drill. U. S. patent 1124241. 1915. Has rotary cutting disks, mounted at an angle with the vertical axis, having broad crushing faces to disintegrate the cuttings.

399. ——— Rotary boring drill. U. S. patent 1124242. 1915. Has rollers for crushing the material at the bottom of the hole, and disk-shaped inclined cutters also provided with crushing faces.

400. ——— Roller boring drill. U. S. patent 1130289. 1915. Drill head contains a roller mounted on a spindle and provided with a cutting surface, with means for adjusting roller to compensate for wear or to vary clearance of drill head.

401. ——— Roller boring drill. U. S. patent 1130290. 1915. Drill head has a horizontal spindle with rotary cutters, and also a larger cutter roller to maintain clearance for the head.

402. ——— Rotary boring drill. U. S. patent 1131701. 1915. Head has disk-shaped cutters that incline inwardly and are so arranged that their edges overlap.

403. ——— Lubricating device for rotary drills. U. S. patent 1136134. 1915. Two concentric cylinders forming an annular chamber for holding a lubricant are coupled together at the lower ends, the upper end of one cylinder being connected to a drill stem.

404. ——— Reamer. U. S. patent 1136135. 1915. Has a vertical and a horizontal cutting blade.

405. ——— Well reamer. U. S. patent 1139529. 1915. Has rotary tapered cutters mounted on horizontal spindles.

406. ——— Cutter for rotary boring drills. U. S. patent 1143271. 1915. Has a grooved cutting surface shaped like the frustum of a cone.

407. ——— Rotary boring drill. U. S. patent 1143272. 1915. A drill provided with a cutter whose axis of rotation is inclined downwardly and inwardly.

408. ——— Rotary drill. U. S. patent 1143273. 1915. A stream of water is projected from the head at such an angle that when it strikes the bottom of the hole the water tends to swirl up around the head in a circular path opposite to the direction in which the drill head is rotating.

409. ———. Demountable cutting edge for drilling tools. U. S. patent 1143275. 1915. By removing a screw the cutting edge can be removed.

410. Humason, G. A. Drill. U. S. patent 1151104. 1915. Has inclined toothed cutting disks.

411. Keck, W. M. Rotary drill bit for oil wells. U. S. patent 1125553. 1915. Includes a shank and a pair of laterally projecting wings terminating in cutting edges. Water is forced diagonally through holes in the stem upon the advancing face of each wing above the cutting edge, to keep face flushed clean of sticky material.

412. Lincoln, R. A. Pipe-clamping device. U. S. patent 1150870. 1915. A pair of clamps are carried by guide blocks mounted at each side of the pipe, one of the blocks having a cam for adjusting it.

413. Myers, G. S. Gripping device for well-boring apparatus. U. S. patent 1143430. 1915. A gripper for pipe rotaries, comprising a supporting sleeve, gripping rings reversibly mounted upon the ends of the sleeve, and means for holding rings in position.

414. Reed, C. E. Revolving-cutter rotary boring drill. U. S. patent 1159087. 1915. The cylindrical head has in its lower end a pair of vertical parallel slots, each slot opening only at its bottom and one side, and having a disk-shaped cutter with the cutting edge extending beyond the side and bottom of the head.

415. ———. Revolving-cutter rotary boring drill. U. S. patent 1159088. 1915. Has two rotary beveled cutting disks mounted on horizontal journals.

416. Ridley, J. V., sr. Well drilling tool. U. S. patent 1166153. 1915. A bit having a cone-shaped centering point at its lower end, and a pair of tapering spiral blades.

417. Seitz, T. F. Boring machine. U. S. patent 1147898. 1915. A hollow cylinder forms a support for a motor and boring tool, the latter having a vertical movement to enable it to close the lower end of the cylinder, thus forming a bailing bucket for removing the borings made by the tool.

418. Weathersby, F. R. Drill. U. S. patent 1131448. 1915. A flat cutter having straight horizontal cutting edges with extensions at the outer ends having horizontal cutting edges in a line below that of the first-mentioned edges.

419. Willard, A. G., and Wilcox, C. E. Well-boring apparatus. U. S. patent 1149486. 1915. Has a rotary table that rotates the boring string by means of a sleeve with a friction band.

420. Wright, C. S. Rotary drilling machine. U. S. patent 1131100. 1915. A rotary table contains four grips that are moved forward to engage, or backward to release, the drilling string by means of screws mounted in rotary sleeve nuts.

## EQUIPMENT.

### RIGS AND DERRICKS.

421. Woodworth, R. B. The development of the steel drilling rig. West. Eng., vol. 6, 1915, pp. 240–244. History of steel drilling rig for oil and water wells from first steel derrick constructed in 1892, to rigs in use at present time.

#### PATENTS.

422. Auchu, Henry. Derrick. U. S. patent 1141919. 1915. A knock-down derrick having a standard or upright composed of telescopic sections.

423. Fontenot, T. Oil-well rig. U. S. patent 1156678. 1915. The drilling shaft is operated by a countershaft driven by the main shaft, which also drives the hoist, means being provided for throwing either the drilling shaft or the hoist into gear. A variable speed transmission device controls the speed of the hoist.

424. Foukes, Philip. Splice for oil derricks. U. S. patent 1146756. 1915. A flanged splice plate encircling a leg of the derrick is bolted to a clamping plate that holds the braces to the leg by interlocking faces, the plates being held in place by friction only.

425. Greve, E. E. Bracing for well-drilling engines. U. S. patent 1144837. 1915. A brace between the derrick leg and the engine having a head fitting into a socket bolted to the engine. A tie rod with a turnbuckle holds the brace in place.

426. Griffin, T. J. Walking beam for drilling rigs. U. S. patent 1129348. 1915. A walking beam having at the drilling end a pair of pivoted levers connected with a temper screw supported by a spring, to lessen the shock on the beam.

427. Jones, N. M. Well-drilling register. U. S. patent 1164002. 1915. A register having a grooved wheel operated by the drilling cable.

428. Kinney, F. Clamp for derricks. U. S. patent 1127450. 1915. A tubular clamp that fits around the derrick leg and has two wings to which the cross braces are bolted.

429. Overly, C. H., and Thompson, O. A. Pulling attachment for oil-well derricks. U. S. patent 1162392. 1915. The winding device moves up and down on a frame. A brake prevents the winding mechanism from turning while being depressed with a hand lever..

430. Parker, C. L. Deep-well outfit. U. S. patent 1149677. 1915. A rod suspended from the crown block has a rotary frame on its lower end with seats adapted to receive the sucker rod sections directly from the cable, the rods being suspended from their upper ends.

431. Peterson, E. Belt lifter for bull wheels. U. S. patent 1133180. 1915. A throw-off loop is fastened to one of the bull-wheel spokes and extends beyond the rim of the wheel. Some of the spokes have shoulders on them to receive the belt.

432. Shaffer, E. E. Method and apparatus for drilling oil and gas wells. U. S. patent 1166011. 1915. Drilling by cable tools and rotating the casing and shoe to underream the well hole and allow the casing to be sunk to the bottom of the hole.

433. Shoup, L. E. Drilling equipment. U. S. patent 1165723. 1915. Feed cable passes over pulley on the walking beam and is long enough to have the spring necessary for drilling.

434. ——— Feed device for drilling rigs. U. S. patent 1165722. 1915. Feed cables are attached to a drum geared to the walking beam of the engine.

435. Zahniser, V. O. Bull wheel. U. S. patent 1143012. 1915. Each pair of spokes is bolted together near the hub and diverge from the bolted part.

### POWER.

*See* No. 1045.

### CASING AND FITTINGS.

436. Natural Gas Journal. Welding and installing casing. Vol. 9, 1915, pp. 552–553. Describes work on the "deep well" at McDonald, Pa.

### PATENTS.

437. Graham, A. C. Well pipe perforator. U. S. patent 1125513. 1915. Has rotary perforators mounted in inclined guideways.

438. Griffin, J. D. Packer for oil wells. U. S. patent 1149751. 1915. A sucker rod tube with a gas vent pipe in it is connected to an outlet tube by a coupler having a check valve in it.

439. Hall, J. T. Oil well plug. U. S. patent 1137205. 1915. Plug contains a valve and is held in place by the friction of balls, mounted in raceways, against the casing.

440. Heggem, A. G. Casing head. U. S. patent 1165253. 1915. Casing head having a rotary plug valve to restrain the flow of fluid while drilling.

441. Hunt, D. F. Well packing. U. S. patent 1136879. 1915. The weight of the casing shears off a rivet holding the shoe, which then telescopes over the casing and forces a fibrous tube, prevented from slipping upward by means of a collar, against the walls of the hole.

442. Kafader, J. O. Well casing drill. U. S. patent 1127011. 1915. Perforator having a horizontal drill bit driven by a bevel gear, and a device for feeding the drill.

443. Mack, P. H., and Mack, F. H. Well packer. U. S. patent 1145155. 1915. A casing having a supplementary packer between two telescoping rings. The weight on the main packer causes the supplementary packer to grip the casing.

444. McKissick, W. H. Device for holding well tubings. U. S. patent 1147108. 1915. A device for holding a tube in place in a well casing by means of slips that grip the casing.

445. Mason, J. A. Casing coupling. U. S. patent 1141910. 1915. A coupling of uniform exterior diameter, each end being a plane surface at right angles to the axis and constituting a projecting earth-cutting shoulder.

446. Moser, F. J. Head for oil wells. U. S. patent 1143302. 1915. A casing head having an opening at the top provided with a flanged seat forming a joint with a flanged tubing support threaded at top and bottom for connection with the tubing.

447. Rigby, C. F. Oil saver. U. S. patent 1152548. 1915. A casing head having a closure with a cable passage, the closure being detachably connected to the head by a latch mechanism; a shoulder on the cable causes the latch to release the closure and permit removal.

448. Shaffer, E. E. Shoe for drilling oil wells. U. S. patent 1163867. 1915. A tapered, tubular, spirally perforated shoe, the perforations being so inclined as to direct the drillings toward the center.

449. Stinson, J. C. Deep-well packer. U. S. patent 1136904. 1915. A locking disk having telescopic pins adapted to engage openings in the casing.

450. Theriot, J. C. Well-drilling tool. U. S. patent 1134930. 1915. A safety device comprising an inner and an outer casing, steel rings mounted to slide on the inner casing, and a packing held in place between the casings.

451. Whisenant, M. B. Machine for raising and lowering well piping. U. S. patent 1137101. 1915. Has two sets of grips, operated by a lever, to grip the pipe while it is being raised or lowered.

452. Wigle, W. B. Head for well casings. U. S. patent 1144626. 1915. A tee head with an opening in the top containing a tapered slip seat for holding the pump tube.

### PROTECTION AGAINST CORROSION.

453. American Gas Light Journal. Protection of pipe lines. Vol. 102, 1915, p. 157. Describes method of coating the pipe with hot asphaltum; specially prepared roofing paper is applied in a spiral wrap or with a longitudinal lap.

454. Pugh, M. R. External corrosion of cast-iron pipe. Trans. Am. Soc. Civil Eng., vol. 78, 1915, pp. 806–856; discussion, pp. 857–879; Am. Gas Light Jour., vol. 103, 1915, pp. 65–70. Remedies suggested for preventing corrosion: Increase skin resistance of cast iron; utilize alkalies by surrounding pipe with lime or cement; exclude acids, salt, and air; galvanize the cast-iron pipe.

455. Schofield, E. H., and Stenger, L. A. Corrosion of metals in natural soils. Eng. Mag., vol. 48, 1915, pp. 588–591. Gives experimental data proving electrolysis without stray currents.

456. Wilson, L. C. The corrosion of iron: protective measures. Eng. Mag., vol. 48, 1915, pp. 517–523, 667–674, 849–858; vol. 49, 1915, pp. 58–66, 202–210. Reviews nature and causes of corrosion of iron and steel; discusses methods of prevention.

457. ——— The influence of different elements on the corrosion of iron. Eng Mag., vol. 50, 1915, pp. 78–86. Discusses liability of corrosion when various alloys are present in iron and steel.

458. ——— Wrought iron or steel pipes? Eng. Mag., vol. 50, 1915, pp. 247–254. Gives relative merits in resisting rust and corrosion.

*See also* No. 527.

## CONTROL OF WATER AND WASTE.

### PATENTS.

459. Fuqua, W. Y. Packing mechanism for oil and water wells. U. S. patent 1127428. 1915. Two pipes, the lower one telescoping within the upper one, are encircled by a set of hinged ribs having the ends pivoted to the pipes. The ribs are inclosed in a flexible cover and expand it against the walls of the hole when the pipes are forced together.

### OTHER METHODS—PATENT.

460. Fuqua, W. Y., and Johnson, C. P. Mechanism for casing off water. U. S. patent 1124602. 1915. Fingers hinged to an upper pipe and held in place by a thin flexible cover are forced outward by a collar on a lower pipe, over which the upper one telescopes, thus piercing the cover and blocking the opening.

## CONTROL OF LARGE WELLS AND WELLS ON FIRE.

461. Johnson, R. H., and Huntley, L. G. Plans for control of wild gas wells. Oil and Gas Jour., vol. 13, May 6, 1915, p. 26; discussion, no. 49, 1915, p. 23. Shows importance of controlling waste of gas. Suggests that the United States Bureau of Mines maintain cars equipped for fighting wild wells.

462. Petroleum Review. The Tacit-Pushcarin hydraulic valve; contrivance for controlling eruptive wells. Vol. 33, 1915, p. 125. Apparatus is described, with illustrations.

463. Scientific American. Extinguishing a burning oil well. Vol. 112, 1915, p. 104. Briefly describes methods used.

### PATENT.

464. Sink, W. R. Process for extinguishing well fires. U. S. patent 1127816. 1915. The outlet of the pipe is permitted to soften under the heat of the fire and then the walls of the pipe are welded together under pressure.

## RECORDS OF FORMATION, COST, ETC.

465. Dalton, W. H. The importance of drilling logs. Jour. Inst. Petroleum Tech., vol. 1, pt. 4, 1915, pp. 191–194. Discusses importance of accurately recording measurements; criticism of the usual printed form of log.

466. Hager, D. Interpretation of oil well logs. Oil and Gas Jour., vol. 14, Dec. 2, 1915, p. 28. Describes need of keeping accurate drill logs.

467. Jewell, W. R. Factors in the cost of oil production. Mine, Quarry and Derrick, vol. 1, 1915, pp. 142–145. Discusses factors determining cost of production; gives tables of costs in California and Pennsylvania.

468. Requa, M. L. Comparative costs of rotary and standard drilling. Bull. Am. Inst. Min. Eng., February, 1915, pp. 217–219. Data given to prove relative value of rotary and standard drilling. Detailed costs are also given.

## PRODUCTION (METHODS, EQUIPMENT, AND OPERATIONS).

*See* General treatises.

### PATENT.

469. Tucker, C. F. Oil hole cover. U. S. patent 1134025. 1915. A cap fits over a plug with a central bore and a side outlet. The cap is held in place with a spring.

### FLOWING OIL WELLS—PATENT.

470. Lock, J. R. Oil well capper. U. S. patent 1130181. 1915. A swinging cap is hinged to a base, the base and cap having an interlocking device and bolts for fastening securely in place.

### PUMPING OIL WELLS.

#### TOOLS AND EQUIPMENT—PATENTS.

471. Bliss, W. L. Oil well closure. U. S. patent 1157498. 1915. A conical plug that fits in a tapered hole in the oil inlet and can be grasped from the outside is held in place by the weight of a ball attached to it by a chain.

472. Bradley, W. H. Pump for oil and like wells. U. S. patent 1129631. 1915. Has an anchor collar with a tapering seat into which an anchor check with an annular shoulder fits. A gland on the lower end of the barrel working freely over the anchor pipe will unseat the anchor check on the upper stroke of the pump when the stroke is lengthened.

473. Calvert, S. L. Pump. U. S. patent 1164917. 1915. An outer barrel around the working barrel forms a sand chamber between them.

474. Church, G. W. Well stuffing box. U. S. patent 1160691. 1915. Packing gland is held down by a lever and counterweight.

475. Downie, R. M. Valve for deep-well pumps. U. S. patent 1161851, 1915. Is provided with a helically grooved cylinder, the groove having an opening at the top, through which the pressure of the fluid being pumped acts on a strip of packing in the groove.

476. Dunlap, J. B., and Bryan, W. D. Sucker rod puller. U. S. patent 1147080. 1915. Gripping devices each consist of a plate having a central opening for the sucker rod, with jaws pivoted in the opening. One plate connects to the upper end of a well casing, and the other plate suspends from a pumping jack.

477. Gamble, G. R. Pump for oil and gas wells and the like. U. S. patent 1132329. 1915. The pump rod passes up through the stuffing box in the head of a motor cylinder which is attached to the well casing, the packing being adjusted from outside the cylinder head.

478. Hanratty, T. H. Well-tubing catcher. U. S. patent 1160073. 1915. On a tube having an inverted L-shaped slot is mounted a spreader with a limited rotary movement and having grab jaws. An expansion head having a lug to engage in the slot spreads the jaws.

479. Kelly, R. A., and Kelly, G. N. Sucker-rod clutch. U. S. patent 1150681. 1915.

480. Kraeer, O. A. Deep-well pump. U. S. patent 1165105. 1915. The piston is composed of valve cups adjusted around the bottom of the piston pipe; the sand protector consists of two sleeves, the lower sleeve having a shoulder which rests on a seat in the top of the pump barrel; the upper sleeve being closed and attached to the piston pipe at the top, and telescoping over the lower one.

481. ——— Pump. U. S. patent 1135821. 1915. Has a solid piston and a sand protector composed of two telescoping pipes through which the piston rod passes.

482. McNallen, A. J. Packer for oil well pumps. U. S. patent 1164655. 1915. A packing head forming a part of the oil tubing and having a chamber surrounding the upper end of the lower tubing and a fly-pass through the packing head from the chamber to the tubing aflove the head.

483. Osborne, E. E. Combination sucker-rod socket. U. S. patent 1153818. 1915. A rotatable sleeve mounted in the case and connected to the sucker-rod grips normally hold them retracted, the connecting device being released by relative rotation of the sleeve and case.

484. Platt, W. O. Bearing for oil well jacks and swing levers. U. S. patent 1129229. 1915. The bearing has on one side a concave face which fits the journal; the other side forms a straight face sloping upwardly. The journal has a central bore forming a lubricant reservoir.

485. Reno, E. V., and Bois, J. A. C. Oil pump. U. S. patent 1135617. 1915. Describes a special type of reciprocating pump.

486. Schildwachter, W. Drill-rod extractor. U. S. patent 1163560. 1915. Beveled gripping jaws are mounted in vertical slots in a hollow conical shank, which contains a device to spread the jaws.

487. Schulien, Joseph. Pumping jack. U. S. patent 1146765. 1915. A pair of links each having one end connected to the rocker and the other to the reach arm, have a cross head trunnioned between them which is fastened to the pumping rod.

488. SMITH, L. D. Pumping jack. U. S. patent 1145813. 1915. The U-shaped frame has an arm clamped to the pump casing and the free ends supported by legs; pitmen geared to the ends of a transverse shaft drive the reciprocating rod of the pump when the shaft is rotated.

489. SOLINGER, A. B. Coupling for oil wells. U. S. patent 1138421. 1915. A tubular part internally threaded at its ends for the stand pipe and well tubing has an annular flange with a marginal shoulder that rests in an annular groove in a ring mounted on the end of the well casing.

490. STEWART, A. M. Combination sucker-rod socket. U. S. patent 1123615. 1915. A slip socket containing a set of slips having the upper gripping part of smaller diameter than the lower part, the two parts being connected by a tapering wall.

491. HARPER, G. A. Well-pumping apparatus. U. S. patent 1150188. 1915. Describes a support for a pumping jack.

## OTHER METHODS.

492. OIL CITY DERRICK. New method for pumping wells. Dec. 23, 1915. An air pressure pumping device, the admission of air being controlled by a float in the well and a balanced walking beam on the surface.

### PATENT.

493. HUFF, W. D. Operating oil wells. U. S. patent 1140982. 1915. In the closed well is inserted a pipe with an ejector at the lower end. Gas under pressure is generated in the well by electricity, blows through the ejector up the pipe, and lifts the column of oil in it.

## CARE OF PRODUCING OIL WELLS.

### PATENTS.

494. AMES, A. Means preventing the accumulation of gas within oil wells. U. S. patent 1139745. 1915. A coupling having a bridge wall with a horizontal bore open to the atmosphere exteriorly of the well, and a pipe open to the bore and to the interior of the well.

495. BREITUNG, E. N., AND PICK, A. Method of treating subterranean wells. U. S. patent 1152392. 1915. The method consists in heating the oil in the closed well, alternately forcing gas into the well under pressure to force the heated oil into the oil sand to melt any waxy sediments, and releasing the gas pressure to allow the oil to again enter the well.

496. REYNOLDS, J. E. Method of preventing the emulsification of oil from wells. U. S. patent 1157903. 1915. Oil is forced into a chamber containing gas under pressure, the flow shut off and turned into a similar chamber, and the content of the first chamber withdrawn, the second chamber being under pressure from the contents of the first. When the second chamber is filled, the operation is reversed.

## GAS WELLS—PATENTS.

497. MOSER, F. J. Anchor for tubings for gas wells. U. S. patent 1150875. 1915. An anchor tee connected to the well tubing has wings that are bolted to the well casing.

498. PURDY, J. S. L. Apparatus for expelling oil or water from natural gas wells. U. S. patent 1153253. 1915. The oil or water is forced into a fluid chamber by artificial pressure. Pressure is then applied to the interior of the chamber and the contents forced up through a pipe.

## RECORDS AND COSTS.

*See* No. 468.

## PRODUCTION (GATHERING AND TREATMENT).

### GAS AND VAPORS.

499. Fulton, L. B. Bridling a gas well. Nat. Gas Jour., vol. 9, 1915, pp. 416–418. Describes operation of regulators.

#### GAGING AND METERING.

500. Natural Gas Journal. Measurement of natural gas by Venturi meters. Vol. 9, 1915, pp. 248–251. Discusses installation of Venturi meters and explains principle and operation.

#### SEPARATION FROM OIL OR WATER.

501. Cooper, A. S. Natural gas in solution with water. California Derrick, vol. 7, August, 1915, pp. 3–4. Discusses action of wells containing water which is charged with natural gas.
502. Oil Age. Starke gas trap. Vol. 11, September, 1915, pp. 6–7. Describes trap and its advantages.
503. Petroleum World. The Trumble gas trap. Vol. 12, 1915, pp. 45–46. Device for preventing loss of the lighter evaporative fractions.

#### PATENTS.

504. Sampson, C. E., and Woods, W. Crude-oil separator-column. U. S. patent 1151290. 1915. Separating chamber has perforated pans through which the oil flows, with means for heating the oil.
505. Snee, J. A. Process for retaining the lighter or more volatile oils contained in the product of oil wells, etc. U. S. patent 1165458. 1915. Method consists in discharging the oil into a liquid and gas container beneath the fluid level of the latter, and removing and absorbing the gaseous hydrocarbons released from the liquid within the container.

## PRODUCTIVENESS OF OIL AND GAS WELLS AND LANDS.

506. Höfer, H. v. Die Dauer eines Erdölbrunnens (The duration of a petroleum well). Petroleum Ztschr., Jahrg. 11, 1915, pp. 62–63. Discusses period of productivity of a well and gives formula for computing the same.
507. Oil and Gas Journal. How long will oil continue to be an available commodity? Vol. 14, Aug. 26, 1915, p. 24. Forecasts importance of shale oil industry in the United States.
508. Oliver, E. The troubles due to over-production. Oildom, vol. 5, April, 1915, pp. 19–22. Discusses unnecessary storage low prices, uncertainty of oil property values, etc.

*See also* No. 352.

### ARTIFICIAL FACTORS, STIMULATION OF PRODUCTION.

#### DECREASE OF PRESSURE—PATENT.

509. Hildebrand, H. D. Method of increasing the flow of gas and vapors from wells. U. S. patent 1126215. 1915. Consists in increasing the temperature in the lower part of the well, drawing the gas and vapors from the well by a vacuum, and reducing the temperature of the gas and vapor as it comes from the well.

#### INCREASE OF PRESSURE BY AIR OR GAS.

510. Dunn, I. L. Method for increasing oil yield. Nat. Petroleum News, vol. 7, October, 1915, pp. 84–85. Explains theory of the Smith-Dunn or Marietta process.

*See also* No. 492.

### ESTIMATING CONTENT OF OIL AND GAS LANDS.

511. Washburne, C. W. The estimation of oil reserves. Bull. Am. Inst. Min. Eng., February, 1915, pp. 469–471; discussion, May, 1915, p. 1169. Gives method for calculating capacity of sands.

## WASTE AND CONSERVATION.

512. Adams, F. D. Waste of natural gas. Mine, Quarry, and Derrick, vol. 1, 1915, pp. 126–128. Discusses waste of gas in the United States and Canada and methods of prevention.

513. Johnson, R. H. Legal and economic aspects of the conservation of oil and gas. Abstracted in Min. and Eng. World, vol. 44, 1915, p. 67. Paper read before Second Pan-American Scientific Congress, 1915; discusses lease forms, royalties, placer claims, and conservation.

514. Payne, C. N. How gas should be conserved. Oil and Gas Jour., vol. 14, Sept. 30, 1915, p. 28. States that commissions should discourage instead of encourage a cheap manufacturing rate for gas.

*See also* Nos. 342, 1450.

514a. Van Hise, C. R. The conservation of natural resources in the United States. New York, 1915, 401 pp. Lectures given at the University of Wisconsin. Discusses conservation of petroleum and natural gas.

## MINING SOLID BITUMENS.

515. Miller, J. S. The mining and refining of lake asphalts and the physical and chemical characteristics of asphalts for paving purposes. Cornell Civ. Eng., vol. 23, 1915, pp. 340–349. Gives tables showing characteristics and analyses of asphalts.

*See also* No. 8.

## FINANCIAL—APPRAISEMENTS, ROYALTIES, CONTRACTS, COSTS, PRICES.

516. Dulin, R. S. Asphaltic and bitulithic pavements; cost of raw material and cost of mining. Jour. Assoc. Eng. Soc., vol. 55, 1915, pp. 67–75. Paper read before Oregon Society of Engineers; includes table showing data on wearing surfaces and costs.

517. Henry, P. W. Depreciation as applied to oil properties. Bull. Am. Inst. Min. Eng., January, 1915, pp. 23–30; discussion, May, 1915, pp. 1148–1151. Discusses amount of earnings to be set aside as reserve for depreciation; depreciable property is divided into three classes—oil lands, field equipment, and wells.

518. Johnson, R. H. Sliding royalties for oil and gas wells. Bull. Am. Inst. Min. Eng., June, 1915, pp. 1291–1294; discussion, December, 1915, pp. 2423–2425. Explains various methods of royalties.

519. ——— Valuation of oil properties. Petroleum Age, vol. 2, December, 1915, pp. 3–8. Paper read before Petroleum Society at San Francisco, Cal., 1915. Discusses factors affecting valuation.

520. Lombardi, M. E. Valuation of oil lands and properties. Trans. Internat. Eng. Congr., Mining Engineering, 1915, pp. 82–126. Describes various elements affecting valuation and gives formulas for ascertaining value per acre.

521. Wyer, S. S. Valuation of natural gas plants for rate making purposes. Nat. Gas Jour., vol. 9, 1915, p. 373. Depreciation in all its forms is discussed, also factors determining natural gas rate schedules.

*See also* No. 513.

# TRANSPORTATION, STORAGE, AND DISTRIBUTION.

## TRANSPORTATION.

*See* Nos. 7, 9, 351, 352.

### PIPE LINES (OIL OR GAS).

522. Crozier, H. W. The shell oil pipe line. Jour. Elec. Power and Gas, vol. 35, 1915, pp. 161–178. Complete details of construction are given.

523. Fisher, J. P. Problems in natural gas engineering. Jour. Am. Soc. Mech. Eng., vol. 37, 1915, pp. 374–377; Gas Age, vol. 36, 1915, pp. 111–112. Discusses problems of flow measurements, compression, and pipe lines as storage tanks.

*See also* No. 352.

### CONSTRUCTION AND MAINTENANCE.

524. Keppelmann, D. E. Welding in gas distribution. Nat. Gas Jour., vol. 9, 1915, pp. 468–480, 504–515. Describes various welding methods.

525. Lord, R. S. Pipe couplings. Proc. Eng. Soc. Western Pennsylvania, June, 1915, pp. 417–437, discussion, pp. 438–458; Nat. Gas Jour., vol. 9, 1915, pp. 556–561. Gives history of oil and gas piping; discusses questions of joints, preservative coatings, and different types of couplings.

526–527. Natural Gas Journal. Modern welding of gas mains. Vol. 9, 1915, pp. 78–79. Describes modern system of welding, the Oxweld system and gives cost data for 4, 8, and 16 inch steel pipe butt welded.

### LINE EQUIPMENT AND TOOLS—PATENTS.

528. Bogle, J. F. Pipe lifter. U. S. patent 1154687. 1915. The lifting levers have dogs for gripping the pipe.

529. Clark, James. Repair device for pipe lines. U. S. patent 1165388. 1915. A spherical split sleeve, which has cylindrical ends, has annular packing strips at each end, and curved concentric strips lining the spherical part. After the sleeve is clamped onto the pipe, the packing strips are tightened by screwing up the followers, one in each end of the sleeve.

530. Crow, W. H. Pipe patching device. U. S. patent 1156890. 1915. A core enlarged at the reamer end passes through a sleeve and has a nut above the sleeve. The reamer end is forced through the pipe wall by means of a rotary chuck and the sleeve expanded by tightening the nut.

531. Merrill, L. M. Screening device for gas or liquids. U. S. patent 1161715. 1915. The side outlet of a tee coupling in the pipe line opens downward into a sediment receptacle. A screen hinged at the bottom side closes over either the outlet end of the coupling, or the sediment discharge outlet.

### TANK CARS AND TANK WAGONS.

532. Lorimer, —. Handling of fuel oil in extreme climatic conditions. Proc. Western Canada Ry. Club, vol. 7, No. 8, 1915; Jour. Am. Soc. Mech. Eng., vol. 37, 1915, p. 420. Paper discusses use of oil fuel and describes design of special tank cars and storage tanks.

533. National Petroleum News. Double-barreled oil-tank truck. Vol. 7, August, 1915, p. 44. Describes trucks carrying two 1,000-gallon tanks.

534. ———. Unloading efficiency of tank wagons and trucks. Vol. 7, November, 1915, pp. 18, 20, 22. Discusses economy of using larger outlets on tanks.

535. Oil and Gas Journals. What is required of tank cars. Vol. 14, July 22, 1915, p. 26. Regulations for transporting inflammable liquids are discussed.

### PATENT.

536. Skelton, T. W. Oil delivery tank. U. S. patent 1158394. 1915. A cylindrical tank rotably mounted in antifriction bearings on a wagon.

### CONSTRUCTION AND MAINTENANCE—PATENTS.

537. Ewell, J. F. Valve for tank cars. U. S. patent 1150586. 1915. One of a pair of toggle links that holds the valve shut by means of flat springs fastened to the tank, is attached to a lever that limits the opening movement of the valve.

538. Greer, J. Tank car. U. S. patent 1163144. 1915. A valve controls the flow to the delivery nozzle. Nozzle has a cap with an orifice in it that can be adjusted to regulate the flow.

539. Knox, W. J. Tank car. U. S. patent 1154324. 1915. The end parts are smaller than the cylindrical central part and are cut away at the bottom to provide space for the bolster and draft sills of the tank.

540. Martinson, Eduard. Oil tank car. U. S. patent 1146636. 1915. A tank having extensions on the ends which are bracketed to the car trucks.

541. ——— Oil tank car. U. S. patent 1156794. 1915. Brackets supporting the tank on the trucks are curved to permit of compensating movement on expansion or contraction of the tank.

## WATER TRANSPORTATION.

542. National Petroleum News. Lake traffic big factor in oil trade. Vol. 7, August, 1915, pp. 70, 72–73. Reviews briefly oil shipping on the Great Lakes.

### TANK STEAMERS.

543. Barringer, H. The evolution of the oil-tank ship. Jour. Inst. Petroleum Tech., vol. 1, pt. 4, 1915, pp. 280–314; discussion, pp. 314–324; Petroleum Rev., vol. 32, 1915, pp. 465–466, 495–496, 509, 526. Historical review of development of oil-tank ships from earliest times.

544. Engineer. Twin-screw motor tank vessel *Hera*. Vol. 120, 1915, pp. 478–479. Gives details of vessel and machinery.

545. Engineering. The "cylindrical tank" oil-carrying steamer *Ricardo A. Mestres*. Vol. 99, 1915, pp. 428–429; Jour. Ind. Eng. Chem., vol. 7, 1915, p. 630. A detailed description of new type of oil tanker and advantages of same.

546. National Petroleum News. New type of tanker. Vol. 7, June, 1915, p. 53. Gives short description of tanker built in England.

547. Petroleum Review. A new type of oil tanker. Vol. 32, 1915, p. 386. New type of tanker which carries the oil in large cylindrical tanks.

### CONSTRUCTION AND MAINTENANCE.

548. Muers, P. Oil ships with cylindrical tanks. Petroleum World, vol. 12, 1915, pp. 249–252. Shows development in construction of bulk oil carrying vessels with cylindrical retainers.

549. Ruprecht, F. K. Conversion of cargo vessels into bulk oil carriers. Int. Marine Eng., vol. 20, 1915, pp. 165–166, 212–216, 258–259, 309–311, 340–343, 404–406. Gives details of necessary changes in construction of vessels.

### RECORDS AND STATISTICS.

550. Petroleum Review. Oil-tanker construction during 1914. Vol. 32, 1915, p. 30. Gives tonnage of tankers launched in England.

## STORAGE.

551. Engineering News. Building an oil storage plant under difficulties. Vol. 74, 1915, pp. 1276–1277. Describes construction of plant at Providence, R. I.

552. Myers, P. Oil storage for submarines at sea. Petroleum World, vol. 12, 1915, pp. 131–133. Describes how underwater craft may get oil secretly from bases; various types of marine storage that can be sunk or floated; commercial advantages.

553. National Petroleum News. Use of hollow tile for tankage insulation. Vol. 7, October, 1915, p. 62. Western oil companies claim that tile wall cuts down evaporation loss and is good fire protection.

554. Strache, H. Fireproof storage of benzine. Ztschr. Ver. Gas Wasserfachm.; Jahrg. 55, 1915, pp. 191–200, 209–222. Describes various apparatus now manufactured.

*See also* No. 532.

### TANKS.

555. Bowie, C. P. Rebuilding a burning oil tank. Eng. News, vol. 74, 1915, p. 976. Describes damage done by fire to a 30,000-barrel tank in Fresno, Cal., and method of reconstruction.

### STEEL AND IRON—PATENTS.

556. Gamble, J. W. Tank construction. U. S. patent 1127226. 1915. Describes a repair section adapted to be inserted from the inside to replace a damaged section having externally flanged parts bolted together. The repair part has an internal marginal flange, and a calking strip is provided between the flanges.

557. Hurlbrink, E. Container for inflammable liquids. U. S. patent 1151184. 1915. A gasometer filled with an inert gas communicates with the container and is provided with a floating bell that automatically shuts off the flow of liquid to the container when the pressure in the gasometer falls to a certain point.

558. Maddox, E. L. Oil tank. U. S. patent 1165011. 1915. Has a tapering deflector for draining water from the oil.

559. Poor, H. Safety storage receptacle for combustible liquids. U. S. patent 1143646. 1915. The water and the gasoline receptacle are each divided by perforated vertical splash plates into small compartments. A water duct opens from the bottom of the gasoline receptacle, from which the gasoline is drawn off at the top.

560. Torrance, J. W., and Ferranti, Ltd. Improvements relating to tanks. English patent 4534. 1916. Petroleum Rev., vol. 33, 1915, p. 314. Method of manufacturing a tank with corrugations.

### CONCRETE.

561. Petroleum Age. Fireproof fuel-oil installation. Vol. 2, April, 1915, pp. 3–5. Describes use of cement and concrete for fire prevention.

### TANK AND RESERVOIR EQUIPMENT—PATENTS.

562. Cole, T. J. Tank sight gage. U. S. patent 1144528. 1915. A float in the tank is connected by means of pulleys to an extensible telescoping sight gage.

563. Garrow, A. J. Self-regulating apparatus for tanks. U. S. patent 1165356. 1915. A float controls a device that operates a rotary valve to regulate the level of liquid in the tank.

564. Holmes, O. J. Gas exhauster for oil tanks. U. S. patent 1136230. 1915. A cover with marginal hinged parts that permit its moving past the internal braces of the tank and mounted in vertical guides floats on the surface of the oil and prevents formation of gas. A gas exhauster removes the gas.

565. Johnstone, F. W. Tank indicator. U. S. patent 1153553. 1915. A float is connected by a cord and pulleys to a counterweight that is similarly connected to an oil-level indicator.

566. Lees, John. Safety tank lock. U. S. patent 1143546. 1915. Valve is within the tank and is operated by means of a shaft, the outer end of which can be locked rigidly in place from outside the tank.

567. Norris, W. P. Cut-off mechanism for tanks. U. S. patent 1151900. 1915. A valve in the discharge pipe is operated by means of a crank arm connected to a rod that extends above the top of the tank.

568. Smith, W. H. Locking valve for fuel oil tanks. U. S. patent 1124965. 1915. A stop cock having on the turning plug a hooked latch that engages a shoulder on the plug casing, thus locking the plug in closed position.

569. Trowbridge, J. A., Jr. Cap for storage tanks. U. S. patent 1166021. 1915. A cap having a spring valve in it to relieve pressure within the tank. The spring is adjusted by means of a screw.

570. Wolf, A. M. Indicating and registering mechanism for tanks. U. S. patent 1136576. 1915. An indicating arm that carries a registering pen and is also provided with indicating fingers for liquids of different specific gravity is operated through a system of levers by a float.

571. Zimtbaum, Nathan. Tank valve. U. S. patent 1143014. 1915. A valve having a seat formed of tapered resilient flanges, and a tapered part to fit over the flanges.

## TEMPORARY AND SMALL CONTAINERS.

572. Miller, C. E. Steel barrels for the distribution of petroleum oils. Oildom, vol. 5, April, 1915, pp. 29–30. Shows growth of steel-barrel manufacturing industry, due chiefly to demand for petroleum barrels.

573. Petroleum World. Sidewalk supply stations for petrol for motor cars. Vol. 12, 1915, pp. 460, 462. Describes stations in Cincinnati, Ohio; coin-in-the-slot service; handling of lubricants with cleanliness and without waste.

574. Wade, H. T. The storage and handling of gasoline in the garage. Sci. Am., vol. 112, 1915, p. 12. Discusses the various systems in use.

### PATENTS.

575. Bowser, A. A. Oil-storage apparatus. U. S. patent 1160106. 1915. The suction pipe has its intake adjacent to the bottom of the tank, and the filling pipe extends below the intake of the suction pipe to form a fluid seal for preventing the escape of gases in the tank through the filling pipe.

576. Caskey, E. M. Tank. U. S. patent 1157675. 1915. A closed tank adapted to be buried and having at each end a passage to the surface so that air circulates through the tank and frees it of vapor.

577. Caslon, S. H. Safety cans for volatile liquids. English patent 7879. 1915. Petroleum Rev., vol. 34, 1916, p. 41. Can has a spring valve in the outlet spout and a lever in the handle that opens the valve when the handle is grasped.

578. Coseo, F. C. Liquid fuel tank. U. S. patent 1132833. 1915. Has two discharge ducts communicating with the tank at different levels. A float valve closes the lower duct when the fuel level is above the opening to the upper duct and opens the lower duct when the fuel level is below the opening to the upper part.

EQUIPMENT—PATENTS.

579. Coffin, H. E. Filler for tanks. U. S. patent 1147785. 1915. A filler with a tightly fitting cover that is clamped shut by means of a lever.

580. Crooks, M. G. Liquid level register and alarm. U. S. patent 1129051. 1915. A float turns a vertical spirally grooved shaft that rings an electric alarm when the liquid reaches a certain level.

581. Easter, C. N. Air vent for barrels. U. S. patent 1168866. 1915. A screw threaded into a sleeve is partly cut away to form a vent when the screw is loosened.

582. Eberhart, C., Jr. Indicator operating device for gasoline tanks. U. S. patent 1133013. 1915. Indicator is operated by a float with two telescoping cylindrical guides.

583. Grove, M. L. Gasoline strainer. U. S. patent 1155914. 1915. A horizontal tubular casing having a removable strainer in the outlet end and a cone-shaped catch basin.

584. Gwynn, A. R. Gasoline filter. U. S. patent 1137480. 1915. A chamois filtering bag on a spring frame is covered with a wire screen, the springs, bag, and screen being securely attached to a ring or head with a screw cap.

585. Hayes, R. W. E. Tank filler. U. S. patent 1157692. 1915. Has a pressure chamber with a nozzle opening into a tube to which the liquid is fed.

586. Hughson, E. B. Gasolene tank attachment. U. S. patent 1135900. 1915. A cylindrical cup opens into a hole in the tank bottom. A discharge pipe which extends up into the cup, is perforated near the upper end, the perforated part being inclosed within an inverted hemispherical strainer with baffles above and below it, the upper baffle closing the top of the pipe.

587. Kelley, E. J. Tank-filling device. U. S. patent 1153116. 1915. Telescoping funnel for filling a tank inclosed in a casing. When not in use the funnel can be slid within the casing and the opening closed.

588. Kessler, L. Filling tube for gasoline receptacles. U. S. patent 1155070. 1915. A tube with a gauze strainer on its lower end contains a short inner tube having a flange on its lower end. Gauze-covered holes in the outer tube above this flange forms an air vent between the tubes.

589. Kraft, H. P. Air valve for liquid-containing vessels. U. S. patent 1159687. 1915. A vent plug having a spring valve opening inwardly into the container.

590. Mioton, S. F. Automatic gasoline service. U. S. patent 1133167. 1915. A tank mounted on a scale is fitted with a siphon so arranged that when the tank is filled, the siphon reverses and empties the tank.

591. Sutherland, F. A. Controlling plug for gasoline filters. U. S. patent 1142992. 1915. A cylinder having on the lower end a screw cap with a vent hole in it that is normally closed but may be opened by unscrewing the cap slightly.

592. Taylor, R. M., and Broe, A. G. Valve plug for volatile containers. U. S. patent 1139463. 1915. Describes a plug containing an outwardly opening double valve held closed by a spring.

LOSSES.

593. Fuel Oil Journal. Many oil fires caused by lightning. Vol. 6, July, 1915, pp. 26, 28. An account of losses in Oklahoma fields. Insurance rates and methods of extinguishing fires are discussed.

*See also* No. 553.

## MEASUREMENT OF VOLUMES AND WEIGHTS, GAGING AND METERING.

**594.** Petroleum World. Automatic measurement of head of oil. Vol. 12, 1915, pp. 595–596. Describes principle of the pneumercator.

**595.** Westcott, H. P. Measurement of gases where density changes. Erie, Pa., Metric Metal Works, 1915, 59 pp. Gives various formulas and tables for determining quantity of natural gas when measured above normal pressure.

### PATENTS.

**596.** Fuhrman, H. C. Pump. U. S. patent 1157686. 1915. Describes a self-measuring pump.

**597.** Mischansky, S. A., and Pawlowski, M. Liquid-measuring apparatus. U. S. patent 1156244. 1915. Describes a tank having a tripping device that closes the inlet when the tank is filled and opens the outlet.

**598.** Reynolds, E. L. Liquid meter. U. S. patent 1125176. 1915. Contains a dumping pan provided with a valve that closes the inlet when the pan dumps.

*See also* Nos. 4, 523, 562, 565, 570, 580, 582.

**598a.** Bureau for the Safe Transportation of Explosives and Other Dangerous Articles. Report of the Chief Inspector, February, 1915. 1915, 92 pp. Report of work for 1914, with statistics on fires in the transportation of gasoline and other inflammable liquids.

## FIRE HAZARDS AND PREVENTION.

**599.** Fuel Oil Journal. Extinguishing tank fires by the Erwin patented system. Vol. 6, August, 1915, p. 44. Discusses advantages and claims of apparatus.

**600.** Gunnison, A. W. Factors affecting fire hazard of oil producing and refining properties. West. Eng., vol. 6, 1915, pp. 245–246. Gives precautions to be taken to reduce danger from fire.

**601.** National Board of Fire Underwriters. Regulations for the installation of containers for hazardous liquids. 1915, 23 pp.

**602.** ——— Regulations for the installation of gravity and pressure tanks, concrete reservoirs, and valve pits. 1915, 88 pp.

**603.** Oelmotor. Zur Frage der Beförderungsvorschriften der Bahntransporte von Mineralölen (Benzin) und Steinkohlenteerölen. (Discussion of railroad transportation regulations for mineral oils, benzine, and tar oils.) Jahrg. 3, 1915, pp. 400–403. Discusses properties, particularly flash point and inflammability, of petroleum, benzines, and their composition; comparison made with coal-tar distillates, particularly benzol.

**604.** Oil and Gas Journal. The foam system to extinguish burning oil. Vol. 13, Mar. 11, 1915, p. 24. Describes process and gives formulas for solutions.

**605.** ——— Foam to extinguish oil fires. Vol. 14, Oct. 21, 1915, p. 23. Explains foam methods and conditions necessary for efficiency.

**606.** Oildom. Rules and regulations for the storage and handling of inflammable liquids; issued by State Fire Marshal of New York, for 1915. Vol. 4, January, 1915, pp. 25–31. Regulations given, with classification of liquids.

**607.** ——— Fire dangers connected with the handling and storage of gasoline. Vol. 4, January, 1915, pp. 31–33. Quotes from paper by W. L. Wedger, read at convention of Massachusetts firemen; discusses dangers of filling automobile gasoline tanks.

**608.** Petroleum Age. A new extinguisher for oil fires. Vol. 2, July, 1915, pp. 8–9. Describes experiment with "foamite," a by-product of licorice.

**609.** Young, J. R. Storing and handling of gasoline. Oildom, vol. 5, August, 1915, pp. 52–53, 56. Gives rules and regulations.

## PATENTS.

610. Aylsworth, J. W. Fire-extinguishing liquid. U. S. patent 1154161. 1915. Consists of carbon tetrachloride in which is dissolved a halogenized aromatic hydrocarbon having a boiling point much higher than that of carbon tetrachloride and serving to retard the rate of volatilization of the latter, mixed with a metallic salt.

611. Bowles, W. M. Safety vent for crude-oil storage tanks. U. S. patent 1162019. 1915. A horizontal pipe having a valve at its juncture with a vertical pipe, the valve being held open by a cord passing through porous diaphragms covered with a layer of fusible material in the vertical pipe.

612. Cunningham, J. W. Oil-tank protector. U. S. patent 1159831. 1915. A conical casing of perforated baffle plates, and having a small outlet hole with valve adjusted by means of a screw.

613. Dodd, W. Means for protecting contents of oil-containing tanks against ignition by electrical discharge. U. S. patent 1155648. 1915. A metal cage entirely inclosing the tank and electrically connected to it at intervals.

614. Erwin, J. B., and Erwin, O. R. Apparatus for extinguishing fires. U. S. patent 1128768. 1915. An extinguisher for tanks containing inflammable liquids. When heated the ingredients are caused to mix and produce a foam which discharges onto the surface of the burning liquid.

615. Gaumer, V. Safety device for inflammable material containers. U. S. patent 1134838. 1915. Consists of a series of flat disks having alternately smooth and corrugated faces forming radial passages and a central duct which is closed at the upper end, the disks being firmly bolted together.

616. Holmes, O. J. Fire apparatus for oil tanks. U. S. patent 1142520. 1915. Consists of a floating cover for the oil, a floating fire extinguisher with its discharge outlet above the cover, and a similar extinguisher having a counterbalance that causes it to rise in the tank as its contents are discharged.

617. Hurlbrink, E. Device for tanks containing inflammable liquids. U. S. patent 1147729. 1915. A storage tank having connected to its top a gasometer containing a protective gas under pressure.

618. Paine, W. H. Safety device for controlling the flow of combustible fluids. U. S. patent 1140313. 1915. A thermally controlled valve having a diaphragm that when heated yields and permits the valve to close.

619. Steiner, P., and Adt, O. Process for extinguishing flames in tanks. U. S. patent 1164234. 1915. Consists in admitting a fire-extinguishing gas to the tank, thus cutting off the access of air to the contents.

620. Sullivan, J. J. Emergency shut-off apparatus for gas or other fluids. U. S. patent 1165554. 1915. Describes a valve, having a fusible connection, that will automatically close if the fusible material should be melted.

621. Wasson, E. A., and Cooley, F. M. Oil tank. U. S. patent 1128202. 1915. An oil tank having a roof sloping upwardly toward the center and provided with a lightning rod.

*See also* Nos. 553, 554, 559, 561, 593.

## LOCAL DISTRIBUTION.

622. Fox, G. F. Rules for operating distributing stations. Nat. Petroleum News, vol. 7, September, 1915, pp. 20, 22, 26. Discusses location of stations as to territory and competition; location and installation of plant; management of distributing stations.

623. Turner, A. E. Specifications for and inspection of interior gas piping. Nat. Gas Jour., vol. 9, 1915, pp. 80–85. Discusses necessity for uniform specifications.

*See also* Nos. 352, 572, 573, 590.

## PROPERTIES AND THEIR DETERMINATION.

624. Holde, D. The examination of hydrocarbon oils and of saponifiable fats and waxes; translated by E. Mueller. New York, John Wiley & Sons, 1915, 458 pp. Discusses physical and chemical properties of petroleum, asphalt, ozokerite, and Montan wax; describes tests in detail.

625. Ingle, Harry. A manual of oils, resins, and paints for students and practical men. London, C. Griffin & Co., vol. 1, 1915. Gives analysis and valuation, chemistry, tests, and classification of oils.

625a. Kempher, L. S. Natural hydrocarbons; what they are, and where they are found in North America. Mine, Quarry, and Derrick, vol. 1, 1915, p. 19. Discusses classification; primary hydrocarbons; light hydrocarbons, heavy hydrocarbons, and aromatic hydrocarbons; petroleum and natural gas fields.

626. Kissling, R. Chemische Technologie des Erdöls (Chemical technology of petroleum). Braunschweig, F. Vieweg & Sohn, 1915, 805 pp.

627. Tinkler, C. K., and Challenger, F. The chemistry of petroleum and its substitutes. London, Crosby, Lockwood & Son, 1915, 336 pp. Treats of chemistry necessary for petroleum industry; deals with petroleum and its products, benzene and its derivatives, and alcohol.

*See also* Nos. 6, 7, 330.

### PHYSICAL PROPERTIES.

628. Rittman, W. F., and Egloff, G. Physical constants of gas oils and derived tars. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 481–484. Describes the results of experiments on four gas oils and the tars derived from them. The relation of volatility to gravity, refractive index, and surface tension are discussed.

629. ——— Relations among the physical constants of petroleum distillates. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 578–582. The distillation range, specific gravity, refractive index, viscosity, surface tension, capillary constants, and molecular weight were determined and ultimate analyses made. The distillation range and specific gravity are the most important, and with the refractive index are sufficient to identify an oil.

630. Rossbacher, H. Variations of the physical characteristics of a petroleum residuum with increasing percentages of grahamite. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 205–206. Describes experiment of fluxing sample of Mexican residuum with increasing percentages of grahamite; raising of melting point is proportional to increase in percentage of grahamite.

#### OPTICAL.

631. Engler, C., and Steinkopf, W. Ueber die Prüfung der Erdöle auf optische Aktivität (Proof of the optical activity of petroleum). Petroleum Ztschr., Jahrg. 10, 1915, p. 485. A study of the optical activity of petroleum as a proof of its organic origin.

632. Marcusson, J. The question of the optical activity of petroleum. Chem. Ztg., Jahrg. 39, 1915, pp. 1243 Chem. Zentralb. Jahrg. 86, Bd. 1, 1915, p. 19. It is assumed from the behavior of cholesterol that the optical activity of mineral oils is due to saturated hydrocarbons formed from cholesterol compounds.

### PHOTOCHEMICAL.

633. Gödrich, P. Beiträge zur Chemie der Asphalte mit besondere Berüchsich tigen ihrer photochemischen Eigenschaften (Contribution to the chemistry of asphalt with especial consideration of its photochemical properties). Monatshefte für Chem., Jahrg. 36, 1915, pp. 535–548. Photochemical properties of asphalt are discussed.

634. ——— The light-sensitiveness of petroleum asphalt. Chem. Ztg., Jahrg. 39, 1915, p. 832. Describes the results of experiments with pitches.

## DENSITY.

*See* Nos. 603, 702, 703, 704, 723, 733, 740, 784, 786, 787.

## SPECIFIC HEAT.

*See* Nos. 722, 723.

### BOILING POINTS AND VAPOR PRESSURES.

635. Chivvis, N. Road oil test for loss in heating. Eng. Rec., vol. 72, 1915, pp. 570–571. Shows wide variation in evaporation due to convection currents in heating ovens now used.

636. Gheorghiu, V. The influence of atmospheric pressure on the boiling point of petroleum products. Chem. Tech. Ztg., Jahrg. 33, 1915, p. 87. Reviewed in Chem. Abs., vol. 10, 1916, p. 1709. Describes in detail distillation apparatus in which constant normal pressure can be maintained throughout a test, thus eliminating variations in boiling point owing to variations in atmospheric pressure.

637. Hughes, H. Oil and the chemist. Mine, Quarry and Derrick, vol. 1, 1915, pp. 23–24. Article is on petroleum fractionation.

### MELTING POINTS.

638. Levene, P. A., West, C. J., and Van der Scheer, J. The preparation and melting points of the higher aliphatic hydrocarbons. Jour. Biol. Chem., vol. 20, 1915, pp. 521–534. Describes methods of preparing the hydrocarbons tested and determining their melting points, and gives results of tests.

639. Miller, J. G., and Sharples, P. P. Methods for determining the melting points of asphalts. Eng. and Contracting, vol. 43, 1915, pp. 87–88, 167. Gives results of tests of the half-inch cube and the ring-and-ball methods, also results of tests with different asphalts.

640. Small, F. H. An apparatus for studying the melting point of paraffin waxes. Jour. Am. Leather Chemists Assoc., vol. 10, 1915, pp. 144–146. Describes apparatus and gives table of results of tests on three samples of wax.

## LUBRICATING VALUE.

641. American Society for Testing Materials. Report of Committee D–2 on standard tests for lubricants. Proc., vol. 15, I, 1915, pp. 279–283; discussion, pp. 295–324. Tests on viscosity of oil are described.

642. Engineering. The theory of lubrication. Vol. 100, 1915, pp. 101–103, 154–155, 196–197, 207–208. Discusses exposition of Osborne Reynolds' theory.

643. Fish, E. H. Properties and selection of lubricating oils. Am. Mach., vol. 42, 1915, pp. 197–200. Discusses properties of various oils, also blending and adulteration.

644. Gill, A. H. Testing lubricating oils. Power, vol. 41, 1915, pp. 522–523. Paper read before Detroit Engineering Society. It enumerates various tests to determine qualities of oil; includes the friction test, gumming test, flash, fire and evaporation test, free acid test.

645. Merchant, R. C. Lubricating oil tests. Coll. Eng., vol. 35, 1915, pp. 615, 625, 627. Paper read before Chemical Society of Northeast Pennsylvania, April, 1915, on various tests, laying stress on the viscosity test.

646. Moore, H. Lubricating oil for Diesel engines and air compressors. Engineer, vol. 120, 1915, p. 176. Gives results of investigations on corroding effect of lubricating oils on copper coils of compressors.

647. Stratford, C. W. Automobile lubrication. Trans. Soc. Auto. Eng., vol. 10, 1915, pp. 86–107; Nat. Petroleum News, vol. 7, June, 1915, pp. 58–63. Gives tests for impurities from sulphuric acid treatment. Carbon residue obtained by distillation does not represent amount of "carbon deposit" in cylinder. No motor oil known that will not deposit sediment in crank case.

*See also* Nos. 717, 795, 797, 799, 800, 801.

## OTHER PROPERTIES OF LIQUIDS.

648. Bancroft, W. D. The theory of emulsification. Jour. Phys. Chem., vol. 19, 1915, pp. 275–309, 513–529; vol. 20, 1916, pp. 1–31.

649. Beutner, R. The true nature of the so-called adsorption potential. Elektrochem Ztschr., Jahrg. 22, 1915, pp. 177–182. Discusses experiments in which salts were added to mixtures of water and oil.

650. Donnan, F. G. Emulsions and emulsification. Engineering, vol. 99, 1915, pp. 551–552. The oil rose to surface in drops, when the oil flowed from a pipet bent upward. The oil rose in a fine stream and not in drops when alkali was added to the water.

651. Dunstan, A. E. Relation between viscosity and chemical constitution; IX, viscosity and fluidity of the aliphatic acids. Jour. Chem. Soc., vol. 107, 1915, pp. 667–672. Gives determination of viscosity for 10 aliphatic acids at different temperatures; transpiration method was used.

652. Glazebrook, R. T., Higgins, W. F., and Pannell, J. R. Viscosity and rate of flow of hydrocarbon oils. Jour. Inst. Petroleum Tech., vol. 2, pt. 5, 1915, pp. 45–67; discussion, pp. 68–84; Petroleum Rev., vol. 33, 1915, pp. 407–408, 435–436, 455–457; Engineering, vol. 100, 1915, pp. 522–524. Describes in detail experiments on the flow of oil in pipes, with oils from various shales.

653. Langmuir, I. Theory of absorption. Phys. Rev., vol. 6, 1915, pp. 79–80. Discusses the theory and causes of adsorption.

654. Morgan, J. L. R. Drop weight method for determining the surface tension of a liquid. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 1461–1467. Outlines the experimental conditions in making determinations.

655. Paul, L. The ability of colophony to combine with its solvents, especially with the hydrocarbons of petroleum. Seifensieder Ztg., Jahrg. 42, 1915, pp. 393–395, 412–413, 434–435. Describes experiments showing that rosin will will absorb alcohol and petroleum to some extent, and that Ca, Na, and $NH_4$ salts of rosin will combine with petroleum.

656. Preston, A. C. Experiments on flow of oil in pipes. Univ. Colorado Jour. Eng., December, 1915. Describes experiments conducted to obtain information for use in designing oil systems.

657. Richards, T. W., and Coombs, L. B. Surface tensions of water, methyl, ethyl and isobutyl alcohols, ethyl butyrate, benzene, and toluene. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 1656–1676. Describes method and apparatus and gives results of tests.

*See also* Nos. 715, 716, 729, 731, 746, 753, 754, 767.

## OTHER PROPERTIES OF SOLIDS.

658. American Society for Testing Materials. Standard tests for penetration of bitumen. Year Book, 1915, p. 446. Gives rules for making test; test adopted in 1911; serial designation D 5–11.

659. Church, S. R., and Weiss, J. M. Some experiments on technical bitumens. Proc. Am. Soc. Test Materials, vol. 15, 1915, pt. 2, pp. 274–293. Gives results of tests on asphalts, tars, and pitches to determine resisting qualities.

660. Crandall, J. S. Present status of adhesive and cohesive tests of bituminous materials. Science, vol. 41, 1915, pp. 801–802. The tests were made on briquets under a pressure of 500 or 750 kilograms per square inch. A Page impact machine was used.

661. Dow, A. W. Report of subcommtttee D–4 on ductility tests. Proc. Am. Soc. Test. Materials, vol. 15, I, 1915, pp. 349–351. The ductility tests by different operators did not give same results, owing to physical changes in samples.

662. Hemstreet, G. P. Report of subcommittee D–4 on the softening point. Proc. Am. Soc. Test. Materials, vol. 15, I, 1915, pp. 341–342. The ring, ball, and cube methods were used to determine softening points. The ring method is not recommended as a standard until other methods have been investigated.

663. Law, L. M. Report of subcommittee D–4 on penetration. Proc. Am. Soc. Test. Materials, vol. 15, I, 1915, pp. 352–355. Describes a proposed method of making penetration tests of bitumen, the apparatus to be used, and the conditions of tests.

664. Scientific American. Testing the consistency of asphalt. Vol. 113, 1915, p. 236. Describes penetrometers electrically controlled and timed.

*See also* No. 775.

## CHEMICAL PROPERTIES.

665. Scheibler, H. Chemical constituents of the bituminous tar oils rich in sulphur. Ber. Deut. chem. Gesell., Bd. 48, 1915, pp. 1815–1826. Chem. Abs., vol. 10, 1916, pp. 540–547. Describes in detail the methods used and results of tests with a crude oil from southern France and two from Tyrol.

### THERMOCHEMICAL.

#### FLASH AND BURNING POINTS.

666. Burrell, G. A., and Boyd, H. T. The quantity of gasoline necessary to produce explosive mixtures in sewers. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 750–754. The quantity of gasoline necessary to produce an explosive mixture is dependent upon the size of sewer, velocity of the sewage, temperature of sewer air, volume of gasoline, rate of inflow, etc. Small amounts can produce dangerous conditions.

*See also* Nos. 779, 780, 782, 785.

#### CALORIFIC POWER AND CALORIMETRY.

667–668. Larkin, F. B. The continuous determination of the calorific value of fuel gases with Junker's calorimeter. Chem. Eng., vol. 22, 1915, pp. 208–209. Gives equation for determining B. t. u. per cubic foot of gas with this calorimeter, and method of using.

669. Lewes, V. B. Motor fuels. Jour. Roy. Soc. Arts, vol. 63, 1915, pp. 757–763. Discusses progress of motor fuel industry; sources of supply and increased demand; compares calorific values of various grades; determination of vapor tension in a liquid fuel; fractional distillation as a test; handling and storage and effect on prices.

670. Richards, T. W., and Barry, F. Heat of combustion of aromatic hydrocarbons and hexamethylene. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 993–1020. Describes apparatus used and gives results of determinations.

671. Roth, W. A., and Auwers, K. v. Thermochemical investigations; III, The heat of combustion of aromatic hydrocarbons and their hydrogenation products. Liebig's Ann., Bd. 407, 1915, pp. 145–175. Gives results of experiments with several compounds.

*See also* Nos. 712, 713, 737, 739, 748, 759, 764, 765, 766, 768, 769.

### ILLUMINATING POWER, BURNING QUALITIES, AND PHOTOMETRY.

672. Jones, D. T. Thermal decomposition of hydrogenated hydrocarbons. Jour. Chem. Soc., vol. 107, 1915, pp. 1582–1588. Cyclohexane, methylcyclohexane, and tetrahydronaphthalene were decomposed and the gaseous products were analyzed. The apparatus used is described in detail, and the results compared with those of other investigators.

673. Jungkunz, R. Beitrag zur Untersuchung und Beurteilung des zu Leuchtzwecken dienenden Petroleums (Contribution to the investigation and valuation of the illuminating petroleums). Chem. Ztg., Jahrg. 39, 1915, pp. 641–642, 659–661; Petroleum Ztschr., Jahrg. 11, 1915, pp. 109–111. Gives fractional distillations on American, Bohemian, Galician, German, Roumanian, and Russian illuminating oils.

674. Kunerth, W. Illuminating power of kerosene. Bull. 37, Iowa State College of Agr. and Mech. Arts, 1915, 31 pp.; Oildom, vol. 4, No. 12, 1915, pp. 25–29; vol. 5, No. 1, 1915, pp. 25–29; Lighting Jour., vol. 3, 1915, pp. 28–33. Describes tests of 61 samples of kerosene from various sources. In general, Eastern oils have lower illuminating power, are lighter, and cost more than Western oils.

675. Wibaut, J. P. Changes in hydrocarbons at high temperatures and the formation of coal tar. Chem. Weekblad, Jahrg. 12, 1915, pp. 954–966.

### ELEMENTARY ANALYSES.

676. Bradbury, W. A., and Owen, F. Estimation of sulphur in motor spirits. Chem. News, vol. 111, 1915, pp. 39–41. Carbureted air is burned in a liter flask; the vapor is burned at end of a tube by a glowing platinum wire which is heated at the start by burning pure benzene.

*See also* Nos. 3, 6.

### HYDROCARBONS AND HYDROCARBON DERIVATIVES.

677. Auwers, K. v., and Treppmann, W. Unsaturated hydroaromatic hydrocarbons. Ber. Deut. chem. Gesell., Bd. 48, 1915, pp. 1207–1225. Discusses experiments with benzylcyclohexanol and phenylcyclohexanol.

678. Bodroux, F. Preparation of hydrocarbons of the formula $Ph_2CHR$, R being an aromatic nucleus. Compt. rend., t. 161, 1915, pp. 131–133. Describes methods of preparation and results of experiments.

679. Gomberg, M., and Jickling, R. L. Triphenylmethyl; preparation of p-hydroxytriphenylcarbinol and attempts to isolate the corresponding triarylmethyl. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 2575–2591. Describes experimental methods used and gives results of tests.

680. Gomberg, M., and Schoepfle, C. S. Triphenylmethyl; the additive compounds of triphenylmethyl and some saturated hydrocarbons. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 2569–2574. Describes experiments with purified paraffins of natural origin and some synthetic aliphatic and alicyclic hydrocarbons.

681. Nametkin, S. S. Saturated bicyclic hydrocarbons. Jour. Russ. Phys. Chem. Soc., vol. 47, 1915, pp. 405–409. Describes results of experiments on nitration of camphane, isocamphane, and camphenylane.

682. Pictet, A., and Bouvier, M. Saturated hydrocarbons from vacuum tar. Compt. rend., t. 160 1915, pp. 629–631; Ber. Deut. chem. Gesell., Bd. 48, 1915, pp. 926–933. A number of hydrocarbons were isolated from the heavy oil distilled from petroleum.

683. Schall, C. Formation of aromatic hydrocarbons by the electrolysis of salts of aromatic carboxylic acids. Ztschr. Elektrochem., Jahrg. 21, 1915, pp. 69–73. Describes electrolytic decomposition of a hot solution of the picric acid in pure acetic anhydride, which yielded a minute quantity of p-dinitrodiphenyl.

684. Sherndal, A. E. Azulene, a blue hydrocarbon. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 1537–1544. Azulene was isolated from oil of cubebs, amyris, guaiac wood, and gurjun. Is closely related to the sesquiterpenes in structure.

*See also* Nos. 638, 665.

### OXYGEN COMPOUNDS.

685. Frankforter, G. B., and Kokatnur, V. The action of trioxymethylene on the various hydrocarbons in the presence of aluminum chloride. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 2399–2401. Answer to paper of Huston and Ewing on "Action of trioxymethylene on p-xylene in the presence of aluminum chloride."

686. Huston, R. C., and Ewing, D. T. The action of trioxymethylene on p-xylene in the presence of aluminum chloride. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 2394–2399, 2401. The resulting reaction does not give $CH_2PH_2$ and anthracene derivatives in equimolecular quantities, and it is possible to obtain polynuclear compounds.

### HALOGEN COMPOUNDS.

687. Frankforter, G. B., and Kritchevsky, W. The action of chloral, bromal, and bensaldehyde on the polycyclic hydrocarbons in the presence of aluminum chloride. Jour. Am. Chem. Soc., vol. 27, 1915, pp. 385–392. Decomposition proceeds vigorously unless temperature is kept at or below °0 C. Action of $AlCl_3$ on polycylic compounds is similar to its action on aromatic compounds, analogous products being formed. A number of new compounds were prepared.

688. Nastyukov, A. M., and Andreev, V. F. Halogen derivatives of the hydrocarbons of the diphenylmethane group. Jour. Russ. Phys. Chem. Soc., vol. 47, 1915, pp. 552–558. Dichlorodiphenylmethane, $CH_2(C_6H_4Cl)_2$, was prepared by mixing PhCl with HCHO in presence of $H_2SO_4$ and heating. By oxidation with $CrO_2Cl_2$, dichlorobenzophenone is obtained. Corresponding compounds were obtained from *o* and *p* $MeC_6H_4Cl$, but p-$C_6H_4Cl_2$ was not affected, even in a large excess of $H_2SO_4$.

### REDUCED HYDROCARBONS, HYDROGENATION, AND CATALYSIS.

*See also No.* 671.

689. Brochet, A., and Bauer, M. Catalytic hydrogenation of liquids under the influence of common metals at moderate temperatures and pressures; IV, Reduction of aliphatic compounds with ethylenic linkings. Bull. soc. chim., t. 17, 1915, pp. 50–55. Anethole, engenol, safrole, and other substances were hydrogenated by mixing usually with a suitable solvent, with 10 to 20 per cent nickel and shaking in an atmosphere of hydrogen under pressure of 15 kg. per sq. cm. and temperatures varying from 13° to 100° C.

### DETECTION OF MIXTURES AND ADULTERANTS.

*See* No. 730.

### MISCELLANEOUS AND SPECIFIC TESTS.

690. Holde, D. Influence on the electrical conductivity of heavy hydrocarbon oils of the presence of soaps of the naphthenic acids and of phenols. Ber. Deut. chem. Gesell., Bd. 48, 1915, pp. 14–19. The conductivity is greatly increased by either of these compounds; heavy tar oil has a greater conductivity than heavy petroleum oils.

691. Holde, D. Nachträgliche Bemerkung über elektrische leitfähige Mineralschmieröle (Further observations on the electrical conductivity of mineral lubricating oils). Ber. Deut. chem. Gesell., Bd. 48, 1915, p. 288.

692. ——— Ueber die elektrische Erregbarkeit und Leitfähigkeit flüssiger Isolatoren (Electrical excitability and conductivity of liquid insulators). Seifenfabr., Jahrg. 35, 1915, pp. 182–184, 207–209; Petroleum Ztschr., Jahrg. 10, 1915, p. 408. Gives results of tests. Degree of excitability depends upon temperature, moisture, and impurities.

## PHYSIOLOGICAL PROPERTIES.

693. Heffter, A. Acute intoxication due to benzene vapors. Deut. med. Wochschr., Jahrg. 41, 1915, pp. 182–185. Describes a fatal accident due to inhalation of crude benzene vapor.

## ANALYTICAL METHODS; DETERMINATION OF PHYSICAL AND CHEMICAL PROPERTIES; APPARATUS AND PROCEDURE.

694. Abeles, V. Bestimmung des Erweichungspunktes von Pech (Determination of the melting point of pitch). Petroleum Ztschr., Jahrg. 11, 1915, p. 160. Describes apparatus and method used.

695. American Society for Testing Materials. Standard test for loss on heating of oil and asphaltic compounds. Year Book, 1915, p. 447. Describes method for determination; test adopted in 1911.

696. ——— Standard test for soluble bitumen. Year Book, 1915, pp. 444–445. Methods for drying and preparing samples and method of analysis; tests adopted in 1911 and serial designation is D5–11.

697. Biazzo, K. Determination of mineral oil in dégras and in mixtures of fatty substances. Ann. chim. applicata, t. 3, 1915, pp. 374–375. Describes method used and results of tests.

698. Bogert, M. T. Two convenient forms of receiver for fractional distillations under diminished pressure. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 785–786. Describes an apparatus by which any number of fractions of large volume can be collected separately without interrupting the vacuum.

699. Bondolfi, F. Esame degli oli leggeri di catrame e dei benzeni commerciali (Examination of light oils, of asphalt, and commercial benzenes). Metallurgia Ital., Oct. 30, 1915, p. 615. Gives practical methods for analyzing and testing petroleum for its commercial by-products.

700. Bosshard, E., and Fischli, E. Bestimmung des Wasserstoffs in gasgemungen durch katalische absorption (Determination of hydrogen in gas mixtures by catalytic absorption). Ztschr. angew. chem., Jahrg. 28, I, 1915, pp. 365–366. Nickel is used as the catalyzer.

701. Burrell, G. A., and Robertson, I. W. The determination of gasoline vapor in air. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 112–113. Describes two methods; a freezing method and a combustion method.

702. ——— A rapid method of fractionating gases at low temperatures. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 210–211. Describes results of experiments with artificial illuminating gas in New York City.

703. ——— Separation of ethane and ethylene by fractional distillation in a vacuum at low temperatures. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 896–902. Fractionation of a mixture of equal volumes of ethylene and ethane at temperatures ranging from −155°C. to −170°C. was effected, but the method is tedious and unsatisfactory.

704. Burrell, G. A., and Robertson, S. W. The separation of gases by fractional distillation in a vacuum at low temperatures. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 209–210. Describes separation of paraffin hydrocarbons in natural gas; separation of illuminants of mixed coal and water gas; separation of gasoline vapor from air.

705. ——— The separation of illuminants in mixed coal and water gas. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 17–21. Results of experiments using artificial gas of Pittsburgh, Pa.

*See also* U. S. Bureau of Mines Technical Paper 104.

706. Chenard, M. Sur les appareils de fractionnement de laboratoire (Laboratory fractionation apparatus). Bull. soc. chim., t. 17, 1915, pp. 38–41. States that for the separation of benzene and toluene a two-bulb Chenard tube, and for separating mixtures of alcohol and water a nine-coil Chenard tube, are as efficient as an 80 cm. Vigreux tube.

707. Church, S. R., and Weiss, J. M. Some experiments on technical bitumens. Proc. Am. Soc. Test. Materials, vol. 15, pt. 2, 1915, pp. 274–296. Describes results of analyses and exposure tests of 18 varieties of asphalts and tar pitches, and methods of making tests.

708. Colman, H. G. Determination of percentage of toluene in commercial solvent naphtha. Jour. Gas Lighting, vol. 129, 1915, pp. 314–315. Describes a convenient method of determination by fractional distillation.

709. ——— Determination of the percentage of toluene in commercial "toluol." Jour. Gas Lighting, vol. 129, 1915, pp. 196–198. Describes method of distillation of commercial toluene samples. Table gives percentage of pure toluene from a distillation in a Wurtz flask.

710. Davis, P. B., and Pratt, L. S. A new form of pycnometer for liquids. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 1199–1200. Describes an instrument which is convenient and accurate.

711. Demorest, D. J. Notes on the determination of hydrocarbons and hydrogen in gas. Jour. Ind. and Eng. Chem., vol. 7, 1915, p. 723. Describes use of combustion pipette with three electric leads and two different platinum spirals. In determining H by the palladiumized asbestos method, palladium tube is enlarged near each end to prevent "poisoning" of palladium.

712. Dickinson, H. C., and Osborne, N. S. An aneroid calorimeter. Jour. Wash. Acad. Sci., vol. 5, 1915, pp. 337–338; U. S. Bur. Standards Sci. Paper 247, July, 1915, 48 pp. Equalization of temperature is obtained by thermal conductivity of the metal container, a copper cylinder with thick walls in which are embedded heating and thermometer coils. For use at low temperatures the instrument is placed in a gasoline bath. A number of temperature measurements are given.

713. Dittus, E. J. Effect of high ignition voltages on the accuracy of bomb calorimeter determinations. Met. and Chem. Eng., vol. 13, 1915, pp. 480–481. Describes experiments to determine whether high ignition voltages increase appreciably the calorific increment due to the melting of a small piece of iron wire to ignite the substance tested. The results showed that unless great accuracy is required the ignition voltage is not important.

714. Dosch, A. Gasanalysenapparate für brennbare Gasmischungen (Apparatus for analysis of combustible gas mixtures). Braunkohle, Jahrg. 14, 1915, pp. 3–20, 27–31, 39–43; Petroleum Ztschr., Jahrg. 10, 1915, pp. 906, 944–945.

715. Engineering. Absolute viscosimeter. Vol. 100, 1915, p. 554. Describes a pressure viscosimeter for rapid determinations that has been successfully used in testing lubricating oils.

716. Faust, O. A simple viscosimeter for determining the inner friction of volatile liquids and of liquid mixtures of volatile substances. Ztschr. Elektrochem., Jahrg. 21, 1915, p. 324. Describes a viscosimeter designed to prevent loss from evaporation in determining the viscosity of volatile liquids.

717–718. Flowers, A. E. A cylinder friction and lubrication testing apparatus. Proc. Am. Soc. Test. Materials, vol. 15, II, 1915, pp. 399–414. The results of tests show the effects of steam pressure, steam temperature, and cylinder-wall temperature, with and without steam, on the friction coefficient for two different lubricants.

719. Frank, F. Detection of benzene in mixtures. Farben-Ztg., Jahrg. 20, 1915, p. 1281. Discusses various methods used.

720. Gas World. War Office benzol test. Vol. 62, Feb. 6, 1915, Coke section, p. 21. Gives directions for distillation test of benzol. In Great Britain a permit to sell must be obtained from the High Explosives Committee if 95 per cent of the benzol does not distill below 90° C.

721. Gray, T. T. A quick method for testing the nonstaining quality of textile oils by means of the Cooper-Hewitt quartz lamp. Oil, Paint and Drug Rep., vol. 88, Aug. 9, 1915, p. 19. Expose pieces of tape treated with oils to be tested to light of a Cooper-Hewitt quartz lamp, using a standard oil for comparison. Half hour's exposure at distance of 6 inches from lamp sufficient to develop stain if oil is likely to color fabric.

722. Hartung, E. J. New method for determining the specific heats of liquids. Trans. Faraday Soc., 1915, pp. 64–68. Sixty c. c. of the liquid is placed in a calorimeter and stirred with a glass bulb containing silver gauze and ice. The ice melts rapidly and the minimum temperature is soon obtained. Specific heats of a number of organic liquids were determined.

723. Heydweiller, A. Determination of the specific heats of fluids. Ann. Physik, Bd. 46, 1915, pp. 253–260. Describes an electrically heated calorimeter and method of using.

724. Hofsäss, M. Bestimmung des spez. Gewichtes von Gasen und die Reduktion auf Normalzustand (Determination of the specific gravity of gases). Jour. Gasbel., Jahrg. 58, 1915, pp. 49–51. Describes method used.

725. Hubbard, P. Methods for the examination of bituminous road materials. Bull. 314, U. S. Dept. Agr., 1915, 48 pp. Gives description of methods, equipment, conversion tables, and report forms.

726–727. Knapp, A. W. Simple method of determining the melting point of fats, etc. Jour. Soc. Chem. Ind., vol. 34, 1915, pp. 1121–1122. Determining the melting point by placing the substance on the bulb of a thermometer and heating it within a test tube by means of a bath of water or glycerol.

728. Krieger, A. Benzolbestimmung im Gase (Determination of benzol in gas). Jour. Gasbel., Jahrg. 58, 1915, pp. 61–64. Describes method and apparatus used by author, and briefly reviews various other methods.

729. MacMichael, R. F. A new direct-reading viscosimeter. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 961–963. Met. and Chem. Eng., vol. 13, 1915, pp. 767–770. Advantages claimed are simplicity of construction, easy temperature control, direct reading, ease of operation, rapidity of determination. Can be used successfully on suspensions that settle rapidly, sticky colloidal solutions, and viscous mixtures.

730. Mix, H. Discrimination of benzine and benzene; a test for benzene in benzine. Kolloid-Ztschr., Jahrg. 17, 1915, pp. 7–9. "Dracorubin," a red resin from the dragon wood of Sumatra, is colorless with benzine but gives a red color test with benzene. Test paper made by dissolving the resin in benzene and absorbing it with filter paper will give a red color test for benzene and detect even small amounts in benzine.

731. Molin, E. Einfache Methode zur Berechnung des Viskositätsgrads von Mineralölmischungen (Simple method of reckoning the viscosity of mineral oil mixtures). Chem. Ztg., Jahrg. 38, 1914, No. 81; Oelmotor, Jahrg. 3, 1915, p. 392. As the viscosity of an oil mixture is affected more by a mineral oil than by a fatty oil of the same viscosity, no general formula for determining the viscosity of oil mixtures can be given. A method for determining the viscosity of mixtures of two mineral oils is described.

732. Nagel, O. Mixing apparatus. Chem. App., Jahrg. 2, 1915, pp. 35–36. Describes apparatus for mixing solids, liquids, and gases.

733. National Petroleum News. Move to standardize oil distillation tests. Vol. 7, July, 1915, p. 62. Report to be made at Petroleum Marketers Association.

734. Neubeck, C. Benzolbestimmung im Gase (The determination of benzol in gas). Jour. Gasbel., Jahrg. 58, 1915, pp. 616–617. Absorption in paraffin oil followed by distillation of the oil at 120° gave good checks when known amounts of benzol were evaporated into a current of air and absorbed. Describes method of extracting benzol by passing gas through a condensing coil cooled with a mixture of carbon dioxide and ether.

735. Northall-Laurie, D. A new method for the determination of toluene in commercial toluoles. Analyst, vol. 40, 1915, pp. 384–389. Method is based on the fact that when a mixture of two miscible substances which do not form a mixture of constant boiling point is boiled, the relation between the molecular composition of the vapor and that of the mixture is constant, and if this relation is known the amount of each constituent can be determined. Boiling point curves and method of application are given.

736. Oelmotor. Oelprüfungsmaschine von Prof. Dr. Sigm. von Kapff (Oil-testing machine). Jahrg. 4, 1915, pp. 35–37; Petroleum Ztschr., Jahrg. 10, 1915, pp. 543–545. Gives an illustrated description.

737. Parr, S. W. An acid-resisting alloy to replace platinum in the construction of a bomb calorimeter. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 2515–2522. An alloy of nickel and chromium, with smaller percentages of copper, molybdenum, and other metals was obtained which resists sulphuric and nitric acid well; it is difficult to cast but machines well, and has a tensile strength of about 50,000 pounds.

738. Randall, D. L. A simple gas-burner for small laboratory furnaces. Jour. Ind. and Eng. Chem., vol. 7, 1915, p. 873. Describes burner devised to use natural gas in heating a small assay furnace of the combined muffle and crucible type.

739. Richards, T. W., and Osgood, G. D. Synthermal regulator, a device for automatically maintaining an adiabatic condition in calorimetry. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 1718–1720. A differential hydrogen thermometer for regulating, by means of an electrical device, the temperature of a series of baths within 0.03° of each other.

740. Rittman, W. F., and Dean, E. W. Analytical distillation of petroleum. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 185–195, 754–760. Compares results with various types of apparatus and still heads.

741. Rittman, W. F., and Moore, J. R. The range of applicability of the liquid sulphur dioxide method for determination of aromatic constituents in hydrocarbon mixtures. Met. and Chem. Eng., vol. 13, 1915, pp. 713–714. The method serves well for mixtures containing small amounts of aromatic hydrocarbons, but can not be used where the proportion is more than 25 per cent. In such cases the mixture should be diluted with pure water-white Pennsylvania kerosene before extraction.

742. Rittman, W. F., Twomey, T. J., and Egloff, G. The estimation of aromatic hydrocarbons in cracked petroleum. Met. and Chem. Eng., vol. 13, 1915, pp. 682–686. Method is based on fractional distillation in a 1-liter flask with a Hempel column filled with aluminum beads. From the specific gravities of the fractions containing the aromatic hydrocarbons, their amount is calculated.

743. Rossbacher, H. Temperature coefficient of expansion of petroleum residuums. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 577–578. The specific gravity of the oil at standard temperature is determined by means of a Hubbard pycnometer. The instrument is then filled and heated in a glycerol bath to desired temperature, any excess of oil escaping, cooled, and weighed. From the weight of oil and the specific gravity the coefficient of expansion is calculated.

744. Schwarz, F., and Marcusson, J. Die Untersuchungen der Dampfturbinenöle (Investigations of oil for steam turbines). Petroleum Ztschr., Jahrg. 10, 1915, p. 618. Describes tests.

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751. Ulzer, F. A new filter press process. Ztschr. angew. Chem., Jahrg. 28, 1, 1915, p. 308. Process involves the principle of electroösmosis. The filter-press chambers contain electrodes by which an electric current is passed through the liquid. The particles in suspension are attracted to the electrodes or fall to the bottom, preventing rapid clogging and the necessity of high pressures. It is claimed that the press will filter the finest particles from liquids, and can be used for filtering ceramic clays, mineral colors, colloidal dyestuffs, barium sulphate, etc.

752. Voller, F. Eine empfindliche Torsionswage und ihre Amvendung auf die Bestimmung von Flüssigkeitsdichten (A sensitive torsion balance and its use in determination of specific gravity of liquids). Ztschr. angew. Chem., Jahrg. 28, 1915, pp. 54–56.

753. Von Vloten, H. K. Viscosimeter for lubricants. Chem. Weekblad, Jahrg. 12, 1915, pp. 429–430. A metal strip is coated on both sides with the lubricant and placed between two cylinders, held against it by weights. Known weights are hung on the strip, and from the relation between the various weights at equilibrium the viscosity of the lubricant is determined.

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756. Weiss, J. M. Specific gravity—its determination for tars, oils, and pitches. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 21–24. Describes laboratory methods and apparatus used by a manufacturing company.

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## PATENTS.

759. Doherty, H. L. Calorimeter. U. S. patent 1150836. 1915. Consists of two concentric tanks, one to contain a combustible gas of known calorific value, and the other a gas whose calorific value is to be determined, a diaphragm of comparatively high heat conductivity forming the dividing wall between the tanks, means for burning the gases in admixture, and for measuring the heat from the combustion.

760. Hays, J. W., and Hays, C. W. Gas-analyzing apparatus. U. S. patent 1153911. 1915. The gas is passed from the measuring vessels into the absorbing vessel, which contains a liquid chemical; the liquid is automatically brought to normal level when the gas is returned to the measuring vessel.

761. ———. Gas-absorbing and indicating apparatus for gas analyzers. U. S. patent 1153912. 1915. The absorber vessel contains an absorbent solution and a measuring burette to which a distensible bag filled with liquid is attached. The gas is forced from the measuring vessel into the absorber and the amount of liquid displaced noted.

762. Heath, C. W. Gas analysis apparatus. U. S. patent 1124452. 1915. The absorbent solution supports a layer of oil, above which is an inclosed space. The residual gas passes into this space and displaces part of the oil into a measuring burette.

763. Matzerath, O. Apparatus for analyzing gases. U. S. patent 1154792. 1915. A hydraulic pump forces the gas from the measuring vessel into the absorption vessel and sucks the nonabsorbed gas back into the measuring vessel.

764. Parr, S. W. Calorimetric apparatus. U. S. patent 1136359. 1915. Has a water chamber of oval cross section containing a cylindrical combustion chamber, a turbine stirrer, water, and a thermometer.

765. ———. Calorimeter. U. S. patent 1136360. 1915. Combustion chamber is shielded by a cylinder that prevents direct contact with the cooling liquid until combustion is well under way.

766. Riche, J. A. Bomb calorimeter. U. S. patent 1163367. 1915. Has an insulating cup from the cover of which the bomb is supported by a split ring.

767. Saybolt, G. M. Viscosimeter. U. S. patent 1132621. 1915. The viscosity tube is heated by a bath in a stationary cup having a turn-table cover provided with stirring paddles.

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*See also* Nos. 628, 629, 654, 658, 667, 668,.777, 784, 1399.

## SPECIFICATIONS FOR PURCHASES, ETC.

770. American Society of Civil Engineers. Discussion on materials for road construction and on standards for their test and use. Proc., vol. 41, 1915, pp. 977–1008, 1213–1218.

771. Broadhurst, W. H. The purchase of asphalt and asphaltic cement on the bitumen basis. Science, vol. 41, 1915, p. 802. As the bitumen is the cementing substance in an asphalt body, the material should be sold on the basis of its bitumen content.

772. Drugs, Oils, and Paints. Specifications for sampling liquids: report of subcommittee of Am. Soc. Test. Materials. Vol. 31, 1915, p. 47. In sampling liquids in barrels or other containers capable of being agitated, contents are to be agitated and a tube inserted so as to be completely filled. No satisfactory method of sampling tank cars has been devised. Methods of sampling from pipe lines were outlined.

773. McLaughlin, F. O. X. Specification and selection of asphaltic materials for street pavement. School of Mines Quart., vol. 36, 1915, pp. 30–39. Suggests solution for problem that has arisen with elimination of long-term guaranty clause in the specifications for asphaltic materials.

774. Mandigo, C. R. Kansas City maintains open asphalt specifications. Eng. News, vol. 74, 1915, pp. 642-644. Gives specifications for asphaltic cement, and discusses advantages of tests prescribed.

775. Puller, H. B. Allowable maximum penetration of various types of asphalts for use on the various kinds of bituminous pavements. Science, vol. 41, 1915, p. 802. • Author states that no set rule can be adopted. Local conditions in conjunction with various bitumens on the market must be taken into account.

776. Surveyor. Bituminous materials for road construction; standards for their test and use. Vol. 47, 1915, pp. 348–351, 406–408. Report of Committee of American Society of Civil Engineers.

*See also* Nos. 658, 695, 696, 1791.

## VARIOUS SPECIES AND FRACTIONS OF BITUMENS AND PETROLEUMS.

### GASEOUS PRODUCTS, INCLUDING NATURAL GAS.

777. Anderson, R. P. The specific absorption of reagents for gas analysis. Jour. Ind. and Eng. Chem., vol. 7, 1915, p. 587. Hempel method of determining "analytical absorbing power" is described; suggests term "specific absorbing power" of reagent.

778. Bone, W. A. Gaseous combustion. Chem. News, vol. 112, 1915, pp. 211–217, 223–225. A review of work of Dixon, Coward, and Wheeler on ignition, propagation of flame through inflammable mixtures, and limits of inflammability.

779. Burrell, G. A., and Boyd, H. T. Inflammability of mixtures of gasoline vapor and air. Tech. Paper 115, U. S. Bureau of Mines, 1915, 18 pp. Describes two methods of determining content of gasoline vapor in air and gives results of tests. Range of complete combustion is between 1.5 and 2.5 per cent. Amount of carbon dioxide produced reaches a maximum at 2.5 per cent of gasoline vapor.

780. ——— Inflammable limits of mixtures of gasoline vapor and air. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 414–417; *see also* Tech. Paper 115, U. S. Bureau of Mines, 1915, 18 pp. Limits with various shapes of container and methods of ignition ranged from 1.5 per cent, lower limit, to 6.4 per cent, upper limit. Increasing the temperature before ignition decreases the low limit.

781. Burrell, G. A., and Oberfell, G. G. Composition of the natural gas used in 25 cities, with a discussion of the properties of natural gas. Tech. Paper 109, U. S. Bureau of Mines. 1915, 22 pp. Methane is the predominating constituent, and in 5 of the samples the only combustible gas; the other 20 also contained ethane and other higher paraffin hydrocarbons. No hydrogen, oxygen, carbon monoxide, hydrogen sulphide, or olifin hydrocarbons were found. Calorific value, 740 to 1,312 B. t. u. per cubic foot. Explosion limits, lower 5 per cent, upper 11.5 per cent.

782. ——— Limits of inflammability of mixtures of methane and air. Tech. Paper 119, U. S. Bureau of Mines, 1915, 30 pp. Describes experiments and results of tests. Low limit under various conditions of tests ranged from 4.9 to 5.6 per methane; upper limit, 13.4 to 15.4 per cent.

783. ——— Variation in composition of natural gas from different sands in the same field. Jour. Ind. and Eng. Chem., vol. 7, 1915, p. 419. Invariably the gas from the shallower sand was found to contain less of the heavier paraffin hydrocarbons than that from the deeper sand.

784. Burrell, G. A., and Robertson, I. W. Determination of benzol in gas mixtures. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 669-670. Describes an apparatus for making determinations and method of using.

785. ——— Influence of temperature and pressure on the explosibility of methane-air mixtures. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 417–419; Tech. Paper 119, U. S. Bureau of Mines, 1915, 30 pp. Results show that pressure and temperature conditions may vary over a wide range without affecting the explosibility of methane-air mixtures. Even in deep coal mines the low limit is not altered from the limit at ordinary temperatures.

786. ——— Vapor pressures of ethane and ethylene at temperatures below their normal boiling points. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 1893–1902. Describes the apparatus and method used and the results of the tests.

787. Burrell, G. A., and Seibert, F. M. Separation of the constituents in natural gas from which gasoline is condensed. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 392–396. Describes the analysis of a natural gas used for making gasoline.

788. Burrell, G. A., Seibert, F. M., and Robertson, I. W. Analysis of natural gas and illuminating gas by fractional distillation in a vacuum at low temperatures and pressures. Tech. Paper 104, U. S. Bureau of Mines, 1915, 41 pp., 7 figs. Describes apparatus and methods used and results of tests.

789. Springer, J. F. "Gasol," a new competitor of acetylene. Machinery, vol. 21, 1915, p. 903. Discusses the applicability of "gasol," made by liquefying waste gas from oil wells after removing the methane from it, to autogenous welding.

790. Webb, H. S. Experiments show action of mixtures. Automobile, vol. 32, 1915, pp. 510–511. Shows action of different combinations of air and gasoline vapor.

*See also* Nos. 3, 4, 7, 342, 724, 728.

## VOLATILE FRACTIONS, INCLUDING MOTOR OILS, GASOLINES, NAPHTHAS, BENZINES.

791. Dieterich, K. Analysis and valuation of motor fuels; 14 methods for examining them. Automobile, vol. 33, July 29, Aug. 5, 1915, pp. 202–205, 247–249, 267. Properties of benzol and gasoline are compared; discusses uses and methods of testing of these fuels.

792. Schmidt, H. Brennstoffe für Dieselmotoren (Fuel for Diesel motors). Elechtrotech. und Maschinenbau, Jahrg. 34, Feb. 7, 1915, pp. 68–71. Gives characteristics and availability of various fuel oils.

*See also* No. 669.

## LUBRICATING, TRANSFORMER, AND SWITCH OILS.

793. Digby, P. Report on switch and transformer oils: sludge formation. Jour. Inst. Elec. Eng., vol. 53, 1915, pp. 146–156. Ozone is drawn through petroleum oil in presence of finely divided copper and iron and the sludge formed is measured. A standard for dry oil is based on dielectric strength and specific resistance.

794. Garrard, C. C. Oil for electrical purposes. Electrician, vol. 73, 1915, p. 797. Discusses tests for oils used for insulation purposes, in oil switches or transformers, including point and plane dielectric test.

795. Horseless Age. Properties of lubricating oils. Vol. 35, 1915, pp. 204, 338. Gives queries and answers as to selection, tests, treatment, etc.

796. Kock, F. Breakdown strength of oils as affected by pressure. Elektrotechn. Ztschr., Jahrg. 36, 1915, pp. 85–88, 99–102. The electric strength of solid, liquid, and semiliquid insulators under pressure was tested. Tests were made of toluene, vaseline, transformers oil, castor oil, paraffin oil, petroleum, benzol, and hard rubber.

797. Philip, A. Demulsification values of mineral lubricating oils for use in steam turbines. Jour. Soc. Chem. Ind., vol. 34, 1915, pp. 697–701. Describes apparatus and method of using. Tests show that oil having demulsification value of 90 or more per cent will give no trouble with emulsions in use on steam turbines. Tables are given showing that adding 1 per cent of fuel oil high in bituminous matter to high demulsification oils lowered the demulsification value.

798. Practical Engineer. Oil-filled electrical apparatus. Vol. 19, 1915, p. 1046. Requirements are given for oils used in oil switches and transformers.

799. Simmons, W. H. Lubricating oils and their composition. Petroleum Rev., vol. 32, pp. 143–144. Lubricating value given of shale and rosin oils, Russian and American mineral oils, and vegetable oils.

800. Stratford, C. W. Automobile lubricants, properties and tests. Horseless Age, vol. 35, 1915, pp. 879–881. Discusses various processes of distilling and refining, gives chemical requisites of motor oils; effect of viscosity on horsepower; fuel and oil consumption.

801. Wing, J. F. Die Eigenschaften von Schmieröle (Properties of lubricating oils). Seifensieder Ztg., Jahrg. 42, 1915, pp. 330–331. Discusses the superiority of mineral oils over other oils for lubricating.

802. Herrnhut, B. Ozocherite e ceresina. Ind. chim. min. e met., t. 2, 1915, pp. 25–30. Occurrence, methods of working up, testing and adulterating, and uses are described.

## RESIDUES.

803. Heyne, H. R. Occurrence, properties, and uses of petroleum paraffine. Fuel Oil Jour., vol. 6, December, 1915, pp. 34–36. Paraffin is found in 90 per cent of American crude oils; explains processes for recovery and refining of paraffin.

804. Marcusson, J. Die festen Bestandteile des Erdöls. (The solid constituents of the mineral oils.) Chem. Ztg., Jahrg. 39, 1915, pp. 581–582, 613–616; Petroleum Rev., vol. 34, 1916, pp. 209–210.

805. Rakuzin, M. A. Composition of the solid fraction of the naphtha paraffins as a criterion of its geologic age. Jour. Russ. Phys. Chem. Soc., vol. 47, 1915, pp. 641–642. Discusses adsorbtion of paraffins through filtration of minerals to the surface.

806. ——— Nature and classification of the solid paraffins of petroleum and methods for their extraction. Jour. Russ. Phys. Chem. Soc., vol. 46, 1914, pp. 1544–1566; Jour. Chem. Soc., vol. 108, 1915, p. 489. Describes process of extracting paraffins, resin, and carbonaceous matter from petroleum by centrifugation; experiments do not confirm theory of Zaloziecki.

807. Rakuzin, M. A., and Arsen'ev, A. A. Specific gravity of the cold and the hot fractions of the solid paraffins of naphtha. Jour. Russ. Phys. Chem. Soc., vol. 47, 1915, pp. 642–645. Specific gravity of the paraffin fractions from naphtha shows that its middle fractions are lighter than itself; impossibility of removing them by centrifugalization.

808. Vasterling, —; Mannich, —; and Kather, —. Merzalin, a substitute for vaseline. Chem. Zentralb., No. 19, 1915; Apoth. Ztg., Nos. 45, 46, 1915; Schweiz. Apoth. Ztg., Jahrg. 53, 1915, pp. 353–354. Discusses the properties of merzalin.

*See also* Nos. 3, 847.

## ASPHALT, TARS, ETC.

809. Blanchard, A. H. Elements of highway engineering. New York, 1915, 497 pp. Discusses tests and uses of bituminous materials, dust prevention, macadam and asphalt pavements.

810. Heyne, H. R. Asphalt. Fuel Oil Jour., vol. 6, October, 1915, pp. 80, 82. Describes occurrence, grades, properties, and uses.

811. Marcusson, J. Untersuchungen über natürliche und kunstliche Asphalte (Investigation of natural and artificial asphalts). Kunstoffe, Jahrg. 5, 1915, pp. 75–78, 90–92, 101–102; Petroleum Ztschr., Jahrg. 10, 1915, pp. 373–374. Properties and uses of coal tar, oil and water gas, tar, pitch, and petroleum residues are discussed; analytical methods are given in detail.

812. Mining and Scientific Press. Manjack. Vol. 111, 1915, p. 86. Briefly describes characteristics, occurrence, and use.

813. Petroleum Zeitschrift. Beiträge zur Teerölfrage (Contribution to the tar-oil question.) Jahrg. 10, 1915, pp. 942 944. Discusses use of tar oil in engines; design and construction of engines.

814. Pierce, D. T. An interesting application of colloidal chemistry. Met. and Chem. Eng., vol. 13, 1915, pp. 408–409. Briefly discusses investigations of colloidal nature of Trinidad asphalt; gives results of investigations as applied to asphalt-paving industry.

815. Richardson, C. The theory of the perfect sheet-asphalt surface. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 463–465. Relation of colloidal chemistry to asphalt surfaces.

*See also* No. 3, 515, 659, 664, 707, 771, 773, 775, 776.

## SHALES.

*See* Nos. 1, 3.

## MISCELLANEOUS.

816. Bumcke, G. Sulphonated oils. Jour. Am. Leather Chemists Assoc., vol. 10, 1915, pp. 559–569. Reviews methods used in German laboratories for estimation or valuation of sulphonated oils.

817. Cormack, J. D. A combustion chart for coal and oil fuels. Coll. Guard, vol. 108, 1915, pp. 527–528. Gives directions for checking, by means of a chart, flue and exhaust and produce gas analyses against a given coal or oil fuel.

818. Journal of Gas Lighting. Petroleum vaporized for preventing naphthalene deposits. Vol. 132, 1915, p. 582. Describes an apparatus in which the gas is passed through a carburetor having a high-pressure steam coil on which petroleum drips and is vaporized.

# REFINING AND REFINERIES.

*See also* Nos. 3, 6, 7, 350.

## PROCESSES AND PRACTICES.

### DEHYDRATING AND CLEANING.

819. Harris, F. W. Raney-Laird dehydrating system. Oil Age, vol. 11, 1915, pp. 6-7. Describes apparatus for removing water from petroleum. Passing electric current through an emulsion coalesces water particles into large enough particles to settle out by gravity. *See* U. S. patents 1142759 and 1142761.

820. Hesser, F. R. Test plant operated to deodorize oil refinery wastes. Eng. Rec., vol. 72, 1915, pp. 541-542. Describes plant and methods for preventing stream pollution by deodorizing wastes; processes of aeration, coagulation, sedimentation, and storage tried.

821. Metallurgical and Chemical Engineering. Oil-drying and purifying outfits. Vol. 13, 1915, p. 977. Apparatus is described in detail; principally for insulating oils, but petroleum, benzine, etc., may be effectively cleaned and dehydrated.

822. Oil and Gas Journal. Treatment of roily oil. Vol. 13, Mar. 4, 1915, p. 27. Describes process for separation of oil and water; foreign matter is precipitated and water separates from oil by gravity.

#### PATENTS.

823. Brown, T. E. Art of centrifugal separation. U. S. patent 1165567. 1915. A rotary separator with a filter of granular material which is continuously fed into and removed from the machine.

824. Burtch, D. Centrifugal separator. U. S. patent 1161839. 1915. Has a hollow horizontal shaft through which the material to be treated is fed into the separator chamber.

825. Corwin, F. E. Oil-purifying apparatus. U. S. patent 1161197. 1915. The dirty oil flows from an elevated tank up through a tank containing a series of oppositely inclined magnetized plates; the purified oil is discharged from the top into a third tank.

826. Dubbs, J. A. Treating oil. U. S. patent 1123502. 1915. Describes a continuous process for removing water from emulsified oil by heating a flowing stream of oil under pressure to a temperature above the boiling point of water at that pressure, condensing the vapor, separating the water from the condensate by gravity, and returning the floating product to the main body of oil.

827. Franke, A. H. Apparatus for purifying oil. U. S. patent 1142512. 1915. The oil flows through a series of superimposed pans, which act as catch basins, in a heating chamber.

828. Gianelloni, V. J. Centrifugal separator. U. S. patent 1166347. 1915. A drum with a removable head is rotated by a hollow spindle through which the liquid to be filtered is fed in.

829. Gray, C. E. Method of and apparatus for desiccating liquid substances. U. S. patent 1157935. 1915. Dried pulverized material is thoroughly mixed with liquid substance, the mixture dried, and the larger particles pulverized and used as a nucleus in the repetition of the cycle of operations.

830. Hughes, H. K. Oil separator. U. S. patent 1131243. 1915. The mixture enters an inlet chamber where sediment is removed and passes to a main separating chamber, where the water is drawn off at the bottom and the oil from the top.

831. Laird, R. E. and Raney, J. H. Apparatus for dehydrating petroleum oil. U. S. patent 1142761. 1915. A treater containing electrodes and equipped with a distributor driven by a synchronous motor connected to a source of alternating current.

832. ——— Apparatus for treating emulsions. U. S. patent 1142760. 1915. A treater containing a series of electrodes with means for producing high potential alternating current.

833. ——— Treater for petroleum emulsions. U. S. patent 1142759. 1915.

834. McNear, F. W., and Bowles, P. E. Process of dehydrating oil. U. S. patent 1158253. 1915. An alternating electric current passed through the emulsion is of sufficient potential and duration to form a chain of globules between the electrodes which short-circuits the electrodes and generates steam, complete chains forming and breaking in rapid succession at different points.

835. Melamid, M., and Grötzinger, L. Reinigen von Harz-, Mineral- und Teerölen. Holland patent 936. 1915.

836. Rensink, G. C. Oil separator and purifier. U. S. patent 1134419. 1915. Contains deflectors and diaphragms for separating and purifying the oil.

837. Sanford, G. E. Centrifugal separator. U. S. patent 1161981. 1915. Bowl has a skimming disk near the top; as the bowl rotates, the liquid rises on the side and is discharged above the disk through an opening in the top of the bowl.

838. Shedlock, J. J. Motor spirits. Canadian patent 166101. 1915. Describes method of purifying liquid hydrocarbons by forcing the liquid through heated solids having an affinity for the impurities and solids of the hydrocarbon.

839. Willemstyn, M. Machine for cleaning crude fuel oil. U. S. patent 1150086. 1915. Oil is forced under pressure through a rotary strainer.

## DISTILLATION OF LIQUIDS.

840. Mining and Engineering World. The Trumbull system of topping plants. Vol. 43, 1915, pp. 811–812. Briefly describes plant at Martinez, Cal.

841. Singer, L. D. Ueber die Destillation von Mineralölen und flüssigen Kohlenwasserstoffen aller Art, Fettsäuren und ähnlichen Materialien (Concerning the distillation of mineral oils and liquid hydrocarbons of all kinds, fatty acids, etc.). Petroleum Ztschr., Jahrg. 10, 1915, pp. 605–608. Advantages of high vacuum distillation are shown. Less chemical treatment of products is required for purification.

*See also* No. 926.

## DISTILLATION OF SOLIDS.

*See* No. 849.

### PATENTS.

842. Clark, E. M. Art of petroleum distillation. U. S. patent 1129034. 1915. Describes a distillation and condensation plant in which the pressure of the uncondensed gases from the condensers is utilized to exert pressure on the material in the stills.

843. ——— Art of petroleum distillation. U. S. patent 1132163. 1915. Treating liquid paraffin hydrocarbons having a boiling point upward of 500° F., to obtain low boiling products of the same series, by heating one still to the desired temperature, then proceeding with cracking and distillation at such temperature, pressure being maintained in this still by the incondensable gases produced from advanced distillation and cracking in another still.

844. Clark, E. M. Petroleum distillation for the production of low-boiling-point hydrocarbons. English patent 1424. 1915. Petroleum Rev., vol. 33, 1915, p. 238. Process consists in circulating rapidly a small stream, under confinement and subjected to cracking temperature, from and back to a supply of the liquid, and condensing the resultant vapor, pressure being maintained on the supply by the vapor.

845. Davis, J. T. Method of and apparatus for distilling oil. U. S. patent 1159186. 1915. The oil is distilled in a series of evaporating chambers each of which has a sloping bottom heated by a sand bath and is connected to a condenser. The oil is sprayed into the chamber by means of a steam jet.

846. Glass, G. Destillation von Rohöl und Dergleich. Hungarian patent "anmeldung," G. 4335. 1915.

847. Hennebutte, Henri. Distillation of hydrocarbons. U. S. patent 1165878. 1915. Process consists in introducing lighter hydrocarbons in liquid condition while the temperature of the mass being distilled is higher than the boiling point of the lighter hydrocarbons, whereby the latter are vaporized and serve as a carrier for the distillates, and then recovering such distillates and reintroducing them to the mass being distilled.

848. Jones, R. G. Apparatus for refining petroleum. U. S. patent 1166375. 1915. The combustion chamber is surmounted by a vertical stack containing a series of shallow pans to which the oil is fed, the vapors from the pans being drawn off through a series of condenser pipes.

849. Macnicol, A. N. Apparatus for obtaining oils, spirits, and gases from organic or other materials or substances. U. S. patent 1165889. 1915. Apparatus for distilling oil, spirits, and gases from organic materials, such as peat, containing gums, resins, or oils, or from other suitable materials.

850. McElheny, W. C. Apparatus for refining oil. U. S. patent 1142826. 1915. A vertical cylindrical tank with a cone-shaped bottom provided with an outlet contains a number of helical pipe coils, the upper and lower ends of the coils being connected to two manifolds beneath the tank.

851. Moore, J. B. Apparatus for distilling petroleum oils. U. S. patent 1130318. 1915. The condensate from the first condenser drains back into the still, the vapors passing to a second condenser through a pipe having a by-pass to the still.

852. Raschig, Fritz. Process and apparatus for continuous distillation. U. S. patent 1141265. 1915. Process comprises passing the liquid successively and continuously through a series of retorts heated to constant temperatures and maintained under progressively increasing vacuums, and continuously removing from each retort the distillate and the undistilled liquid.

853. Rosen, J. Process of distillation of heavy oils. U. S. patent 1162654. 1915. Process consists in constantly increasing the temperature of the oil and in introducing in successive order lighter hydrocarbons in liquid condition and of gradually increasing boiling points lower than the temperature of the mass being distilled, whereby such lighter hydrocarbons are vaporized and serve as carriers for the distillates.

854. Stewart, L. Process of and apparatus for distilling petroleum. U. S. patent 1163570. 1915. Describes method and apparatus for separating oil in products of different densities by heating the oil under pressure by a series of stages and relieving the pressure between the stages, collecting the vapors at each stage, and condensing the vapor.

855. Thompson, W. P. Distillation of petroleum. U. S. patent 1160670. 1915. Cracking process which consists in adding finely divided freshly reduced nickel to the liquid in the cracking still and passing hydrogen through the mixture with violent agitation.

856. Thorssell, C. T. A method of evaporation and distillation of liquids. Canadian patent 162960. 1915. The vapor generated at or near the critical point of the liquid is exposed to a small fall of pressure and temperature in such a manner that the vapor is condensed.

857. Tudor, H. Process and apparatus for distilling heavy crude petroleum. English patent 12570. 1915. The crude petroleum is first heated to about 90° C. to separate the water, then heated by intermittent stages to about 420° C., the pressure in the retorts being raised after each increase of temperature, and then decreased.

858. Van Dyke, J. W., and Irish, W. M. Fractional condenser for separating hydrocarbons in distilling petroleum. U. S. patent 1130862. 1915. Contains a number of condensing pipes cooled by air.

859. ——— Process of and apparatus for distilling petroleum. U. S. patent 1143466. 1915. The petroleum is heated to desired temperature, the vapors partly condensed in air-cooled pipes, the condensate exposed to vapors of higher temperature, and removed.

860. ——— Setting for petroleum stills or analogous vessels. U. S. patent 1152576. 1915. Columns have lugs for supporting the still are braced and held in place by plates that form a gas-tight heating space for the still, the columns and plates being protected by an insulating lining.

861. Warth, C. H. Process of making liquid fuel. U. S. patent 1131880. 1915. A process for combining a petroleum distillate, such as kerosene, with a coal-tar distillate, such as benzol, by vaporizing the mixture and then condensing the vapor by subjecting it to successively lower temperatures.

862. Whitmore, S. W. Process of refining oils. U. S. patent 1125422. 1915. About 10 per cent of naphthalene is added to the oil and the mixture is distilled.

## CRACKING OF LIQUIDS.

863. Brooks, B. T. The cracking and distillation of petroleum under pressure. Jour. Franklin Inst., vol. 180, 1915, pp. 653-672. Reviews and discusses various patented processes, and gives results of experiments on them.

864. Brooks, B. T., and Others. The preparation of gasoline and kerosene from heavier hydrocarbons. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 180–185. Discusses cracking of petroleum by heating, by distillation under pressure, and by catalysis.

865. Claudy, C. H. The Burton process of "cracking" to make gasoline. Sci. Am., vol. 112, Jan. 2, 1915, pp. 5, 32. A popular article on this method.

866. Dyer, E. I. The cracking of oils. Min. and Sci. Press, vol. 110, 1915, p. 717. Briefly discusses cracking processes.

867. Ellis, C., and Wells, A. A. Gasoline from heavier hydrocarbons. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 1029-1033. Describes experiments in cracking petroleum oils by heating in stills, tubes, heating with reagents, and by contact with molten metal, and gives results of tests.

868. Freud, B. B. The "cracking" of hydrocarbons. Chem. Eng., vol. 21, 1915, pp. 160–162. A discussion of production of gasoline from heavy oils by heating under pressure.

869. Hall, W. A. The cracking of oils with a view to obtaining motor spirit and other products. Jour. Inst. Petroleum Tech., vol. 1, part 3, 1915, pp. 147–166; Jour. Soc. Chem. Ind., vol. 35, 1916, p. 296. Describes the Burton process, in detail.

870. ——— Manufacture of motor spirit by cracking heavy oils. Engineering, vol. 99, 1915, pp. 250-251; Jour. Gas Lighting, vol. 129, 1915, p. 455. Briefly describes and discusses Hall process of cracking oils.

871. James, H. G. Various cracking processes; their value to refiners. Oil and Gas Jour., vol. 14, Dec. 16, 1915, pp. 26 28; no. 29, pp. 26–28. Discusses Burton, Rittman, and other processes for making gasoline.

872. Jimenez, J. V. Nuevos procedimientos para obtener naftas (gasolinas) de los resíduos de la destilación del petróleo (New processes for obtaining gasoline from the residuum of petroleum distillation.) Bol. de Minas, Lima, Mar. 31, 1915, pp. 3–13. Reviews progress in distilling and refining petroleum; explains Burton and Day patents.

873. Lewes, V. B. The chemistry of the "cracking" of heavy oils. Jour. Inst. Petroleum Tech., vol. 1, part 3, 1915, pp. 167–176; discussion, pp. 176–185: Petroleum Rev., vol. 32, 1915, pp. 255–256, 275–276, 295–296; Petroleum World, vol. 12, 1915, pp. 141–145. Discusses the production of naphthenes and aromatic hydrocarbons from petroleum residues.

874. ——— Motor fuels. Jour. Gas Lighting, vol. 129, 1915, p. 599; Am. Gas Light Jour., vol. 103, 1915, pp. 165–167, 170–171, 178–181. The Burton and Hall processes of cracking oils are compared.

875. McAfee, A. M. Improvement of high-boiling petroleum oils and the manufacture of gasoline as a by-product therefrom by the action of aluminum chloride. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 737–741; Met. and Chem. Eng., vol. 13, 1915, pp. 592–597; Am. Gas Light Jour., vol. 103, 1915, pp. 293–295, 298. Describes the McAfee process.

876. ——— The McAfee gasoline process. Nat. Petroleum News, vol. 7, April, 1915, pp. 20–25; 1915, pp. 34–38. Describes method and gives results of tests on four crudes, Texas, Mexico, Caddo, and Oklahoma.

877. ——— The McAfee refining process. Petroleum Rev., vol. 33, 1915, pp. 467–468. Describes process and its advantages.

878. National Petroleum News. Makes gasoline without high pressure. Vol. 7, July, 1915, p. 46. Describes Kelsey process of making gasoline from fuel oil without the use of appreciable pressure. Temperatures of 750 to 800° F. are employed.

879. ——— Patents offer new ways of increasing gasoline yield. Vol. 7, March, 1915, pp. 57–58. Discusses various processes.

880. Nature. The "cracking" of oils and its commercial use. Vol. 95, 1915, pp. 231–233. Distinction made between decomposition and dissociation; discusses various cracking processes.

881. Petroleum World. Description of the Burton process for cracking oils. Vol. 12, 1915, pp. 138–139. Gives diagram of apparatus, with description of operation.

882. Rittman, W. F. The Rittman gasoline process. Nat. Petroleum News, vol. 7, March, 1915, pp. 2–4. Describes the results of experiments by the writer and the method used.

883. ——— Thermal reactions of petroleum hydrocarbons in the vapor phase. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 945–953. Discusses the theory of the reactions in cracking hydrocarbons under the influence of heat and pressure. Gives experimental results of cracking three oils under varying conditions of temperature and pressure, and discusses the results and their application.

884. Snelling, W. O. Motor spirit from synthetic crude oil. Bull. Am. Inst. Min. Eng., April, 1915, pp. 695–704; discussion, May, 1915, pp 1163–1169; January, 1916, pp. 173–176. Describes a laboratory method of producing gasoline from heavy oils, and gives results of tests. Discusses the industrial application of heavy oils and their relations to the genesis of petroleum.

885. ——— Synthetic crude oil. Am. Gas Light Jour., vol. 102, 1915, p. 156. Describes experiments on the production of synthetic crude oil and gives results of experiments.

886. Ter-Gazarian, G. The pyrogenetic transformation of petroleum. Petroleum Rev., vol. 33, 1915, pp. 515–516. Discusses possibility of obtaining dyes and pharmaceutical products from petroleum instead of coal tar.

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888. Danckwardt, Paul. Process for the production of gasoline and naphtha from crude oils, petroleum products, tar oil, or similar products. U. S. patent 1141529. 1915. Process consists in spraying into the retort a heated liquid which is practically indistillable and is insoluble in the liquid to be distilled, then withdrawing it, passing it through a heater, and returning it to the retort, the evolved vapor being continuously collected from the retort.

889. Dubbs, J. A. Treatment of petroleum. U. S. patent 1135506. 1915. Process consists in mixing water with petroleum or its derivatives, heating the mixture, subjecting it to more than atmospheric pressure, and then relieving the pressure and collecting the products.

890. Hall Motor Fuel, Ltd. Production of liquid fuel, particularly suitable for use in high-speed internal-combustion engines. English patent 6069. 1915 Process of forming volatile hydrocarbons, liquid at ordinary temperatures, by subjecting the heated gases and vapors from the cracking of hydrocarbon oils to increased pressure under substantially adia' atic conditions, and condensing the products so formed.

891. Seidenschnur, F., and Dehnst, J. Process of treating crude petroleum. U. S. patent 1162729. 1915. Process consists in atomizing crude petroleum at a temperature between 380° and 400° C. under a pressure of less than 760 mm. mercury and introducing 30 to 40 per cent of superheated steam, temperature 450° to 500° C., into the atomized petroleum, raising the temperature to 420° to 430° C., and cooling the separated vapors gradually.

892. Sociedad Simplex Refining Co. Transforming heavy oil into light oil. Spanish patent 61145. 1915.

893. Testelin, A., and Renard, G. Apparatus for the industrial manufacture of a new spirit by the isomerization of petroleum. U. S. patent 1138260. 1915. An apparatus for the continuous manufacture of volatile spirit from a mixture of steam and fluid hydrocar' on by heat treatment at high pressure.

894. Turner, C. W. Process of distilling hydrocarbon oil. U. S. patent 1151422. 1915. Consists in subjecting mixed oil and water vapors alternately to pressure and heat and to expansion and cooling, thus cracking the lighter constituents to form an increased percentage of lighter hydrocarbons and at the same time depositing the heavier constituents, and then releasing the vapor products from pressure and heat and separating the different gravities.

895. Wade, Harold. Process of and apparatus for converting petroleum of a high boiling point into petroleum of a lower boiling point. English patent 1226. 1915. Petroleum Rev., vol. 34, 1916, p. 41. Process for treatment of fuel oil or other liquid hydrocarbons, in which a battery of two or more stills is employed and the gases produced in one or more of the stills by the distillation of the hydrocarbon in an advanced stage of distillation under elevated heat and pressure are used to give the initial pressure required to prevent fractional distillation in other stills of the battery.

896. Washburn, C. H. Process of treating hydrocarbon oils. U. S. patent 1138266. 1915. Process consists in passing oil and water into a retort and leading off the vapor to a condenser, the terminal of which is closed to create a back pressure of three to five atmospheres in the retort and condenser.

*See also* Nos. 6, 844.

WITH CATALYZERS.

897. Bjerregaard, A. P. Studies on the pressure distillation of petroleum hydrocarbons. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 573–577. Gives detailed report of results of experiments on the cracking of oils.

898. National Petroleum News. Manufacture of gasoline from low grade oils. Vol. 7, 1915, pp. 20–24. From 1 to 5 per cent of aluminum chloride is placed in the still with the oil; no pressure is used; large yields of gasoline are obtained from crude oils.

899. Petroleum Review. The Gulf Refining Company to test new process; McAfee process explained. Vol. 33, 1915, pp. 27–28, 47–48, 74. Aluminum chloride process is described; gives large yield and facilitates extraction; carried on at atmospheric pressure and at low temperature.

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900. Ellis, C. Composition for treating oils. U. S. patent 1158664. 1915. A catalytic composition for hydrogenating oily material containing unsaturated compounds which comprises finely divided colloidal nickel incorporated with a coarser inert mineral material.

901. McAfee, A. Process of improving oils. U. S. patent 1127465. 1915; Canadian patent 163091. 1915. Heating crude petroleum with aluminum chloride and distilling off the low-boiling oils produced till a substantial proportion of the high boiling oil has been converted into low-boiling oils, cooling residual high-boiling oil, and separating the high-boiling oils and the aluminum chloride.

902. ——— The conversion of petroleum oils. Canadian patent 163092. 1915. The process of boiling petroleum oils in the presence of finely divided metal, while leading a current of chlorine gas into contact with the oil.

903. ——— The purification of high-boiling mineral lubricating oils. Canadian patent 163093. 1915. Chem. Abs., vol. 9, 1915, p. 2979. The process of warming such oil with dry $AlCl_3$ at a temperature below that at which any substantial amount of low-boiling oils will form.

904. ——— Treatment of petroleum oils. Canadian patent 163671. 1915. Chem. Abs., vol. 9, 1915. p. 2979. The process comprises continuous distillation of low-boiling vapors from a body of high-boiling oil containing $AlCl_3$ and a continuous supply of fresh oil to the body to maintain it at constant volatility.

905. Sabatier, P., and Mailhe, A. Manufacture of light hydrocarbons or the like. U. S. patent 1124333. 1915. Process consists in passing the vapors of the hydrocarbons to be treated over catalyzing metals maintained at red heat by an electric current.

906. ——— Process of converting petroleums and other heavy liquid hydrocarbons into volatile hydrocarbons distilling below 150° C. U. S. patent 1152765. 1915. Process consists in mixing finely-divided iron with neutral substances free from considerable quantities of silica, to reduce the catalyzing property of the iron; heating the mixture, passing the hydrocarbons to be treated over it, passing steam over the catalytic body to revivify the latter by the water gas formed; and subjecting the volatile products to hydrogenation in the presence of finely divided metal heated to a temperature between 150° and 300° C.

907. Wade, H. Apparatus for treating liquid hydrocarbons for the production of hydrocarbons of lower boiling points. English patent 7541. 1915. Petroleum Rev., vol. 33, 1915, pp. 253, 398. Consists of an arrangement of catalytic plates in a still, about and over which the still contents circulate while undergoing distillation.

## GASIFYING AND PRODUCTION OF LAMPBLACK AND COKE.

908. Jones, E. C., and Jones, L. B. The improved Jones oil gas process at the Potrero Gas Works, San Francisco. Am. Gas Light Jour., vol. 103, 1915, pp. 23–27. Describes process and apparatus for preparation of oil gas of high calorific value and high $CH_4$ content; formation of lampblack is eliminated.

909. Petroleum World. The Mansfield system of oil gas producing. Vol. 12, 1915, pp. 600–602. Describes simple and inexpensive plant for converting oil into gas that can be used for light, heat, or power; method of manufacture, cost, and other data given.

910. Whitaker, M. C., and Alexander, C. M. The time factor in making oil gas. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 484–495. Discusses variation of composition of products obtained in making oil gas; describes experiments and results.

## PATENTS.

911. Biddlecombe, F. G. L. Apparatus for the generation of combustible gas or vapor from liquid fuel. U. S. patent 1147363. 1915. Heating chamber contains a special type of flange down which the fuel flows.

912. Clark, C. E. Gas generating system. U. S. patent 1147608. 1915. The atomizer discharges a mixture of oil and air into a mixing chamber, which contains a filter and a device for receiving sediment.

913. Hennebutte, H. Manufacture of pure carbon. U. S. patent 1155419. 1915. Oxidizing gas is passed through heated hydrocarbons and a solvent added; the dehydrogenated insoluble substance is then separated from the oxidized mass and carbonized.

914. Johnson, H. T. Kiln or furnace for treatment of carbonaceous materials. U. S. patent 1141118. 1915. Describes apparatus for reducing petroleum, coke, or other carbonaceous material to make carbon conductors.

915. Latta, Nisbet. Gas producer. U. S. patent 1142524. 1915. The vertical vaporizing chamber contains a series of inclined shelves, the fuel being fed in at the top and the air at the bottom.

916. McHenry, C. Gas-generating apparatus. U. S. patent 1154869. 1915. Apparatus in which oil and water are emulsified and then vaporized.

917. Percival, F. N., and Patterson, W. Kerosene gas generator. U. S. patent 1131157. 1915. Oil is heated by a heating plate in the mixing chamber.

918. Pictet, R. P. Process of making hydrogen. U. S. patent 1134416. 1915. A current of hydrocarbon vapor passing through a conduit is heated to a temperature sufficient to dissociate the carbon and hydrogen.

919. Rites, F. M. Apparatus for producing gaseous fuel. U. S. patent 1144788. 1915. Oil is distilled in a vaporizing chamber, he heavy oil being drained into a combustion chamber and partly burned in the presence of steam, the vapor so produced being added to the gas from the vaporizing chamber.

920. Southey, A. W. Production of gaseous fuel from liquid hydrocarbons for motor power purposes. Description of English patent. Petroleum Rev., vol. 32, 1915, p. 134. The fuel, before mixing with air, is vaporized by partial combustion at a point between the fuel sprayer and the carbureting zone, in such manner the flame of the liquid fuel is automatically extinguished.

921. Weiser, J. Oil retort. U. S. patent 1127951. 1915. A device for carbonizing petroleum.

922. Westrup, C. J. Manufacture and use of oil gas. English patent 345. 1915. Petroleum Rev., vol. 33, 1915, p. 478. Vapor discharges from the vaporizing chamber through a control valve. In the supply pipe is a block with a cone-shaped orifice, the block being held in the desired position by set screws.

## DISTILLATION OF SOLIDS.

### OIL SHALES.

923. Perkin, F. M. The manufacture of shale oils. Chem. Trade Jour., vol. 56, 1915, p. 96. Describes a method of distilling and refining oil from oil shales.

*See also* Nos. 1, 6.

## CONDENSATION—PATENTS.

924. Leyendecker, P. J. Condenser. U. S. patent 1146722. 1915. Has a series of condensing pipes with a gas inlet and a liquid outlet connected to a fluctuation tank.

925. Roberts, A. E. Apparatus for recovering hydrocarbon products from gas. U. S. patent 1150454. 1915. Comprises a cooler to which the gas is delivered at suitable pressure, and successive expansion and condensing traps into which gas is admitted at different pressures and temperatures for precipitating various grades of oil.

926. Schenk, J. D. Condenser and vaporizer. U. S. patent 1151054. 1915. Contains a series of superimposed heating plates.

## TREATMENT TO IMPROVE PROPERTIES—PATENTS.

927–928. Kreybig, L. Treating fats and oils. Holland patent 902. 1915.

929. Whitmore, S. W. Refining petroleum. English patent 19884. 1915. Naphthalene is added to petroleum or to the distillates or residues of distillation, to improve the color and odor; it also increases the illuminating properties of the distillates and the lubricating properties of the heavy distillates and residues.

### CHEMICAL—PATENT.

930. Hennebutte, H. G. Refining petroleum. U. S. patent 1165877. 1915. Describes process of manufacturing cylinder oils from petroleum hydrocarbons by passing air through the heated oil and then distilling it without subsequent refining.

### HYDROGENATION, OXYGENATION, HALOGENATION, NITRATION, AND CATALYSIS.

931. Campbell, A. Hydrogenated oils. Jour. Am. Pharm. Assoc., vol. 4, 1915, pp. 675–676. Reviews methods of hydrogenation.

932. Jaubert, G. F. L'hydrogenation des huiles et des corps gras. Rev. gèn. chim., t. 18, 1915, pp. 117–133, 144–160; Genie civil, t. 66, 1915, p. 157. Outlines the industry of hydrogenation of oils and fatty compounds.

933. Lumbard, V. J. Hydrogenation of oils. Jour. Am. Leather Chemists Assoc., vol. 10, 1915, pp. 80–87. Explains process and reviews several patented methods in which nickel and nickel compounds are used.

934. Moore, H. The oxidation of lubricating oil. Petroleum World, vol. 12, 1915, pp. 617–619. Describes cooling coils of compressors worn and damaged by corrosion, the acid liquor used, "sludging," tests with various oils, and theory of iodine value test.

935. Rather, J. B., and Reid E. E. Catalytic hydrogenation; I. New method of hydrogenation of volatile substances and the rate of hydrogenation of ethylene. Jour. Am. Chem. Soc., vol. 37, 1915, pp. 2115–2118. Describes the method used and gives the results of tests.

936. Rivals, Paul. Conférence sur l'hydrogénation des huiles faite devant la Société Scientifique Industrielle de Marseille, Jan. 29, 1914. (Discussion of the hydrogenation of oils before the Scientific Industrial Societyat Marseilles). Rev. gèn. chim., t. 18, Jan. 17, 1915, pp. 9–26; Génie civil, t. 66, 1915, p. 189. Owing to new catalytic methods direct hydrogenation of oils has become industrially important. Explains process of hydrogenation in presence of nickel (Sabatier and Senderens), also, method of Paa, using platinum and palladium.

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937. Senderens, J. B., and Aboulenc, J. Use of nickel and its oxides in catalysis. Bull. soc. chim., t. 17, 1915, pp. 14–19. Discusses hydrogenation with nickel and nickel oxide catalyzers.

938. Birkeland, K. and Devik, O. Process of hardening oils. U. S. patent 1125259. 1915. Oil mixed with a catalyzer is jetted through hydrogen gas into a mass of oil under pressure, so that hydrogen is carried down into the oil and absorbed: the oil is then subjected to a rapid change of pressure.

939. Calvert, George. Process for the hydrogenization of oils. U. S. patent 1142668. 1915; Canadian patent 166053, 1915. A mixture of oil and catalyst is heated under pressure in the presence of hydrogen, with agitation of the mixture.

940. De Jahn, F. W. Hydrogenizing fatty matter. U. S. patent 1131339. 1915. Finely divided fatty matter is intimately mixed with hydrogen in one vessel, and then subjected to the action of a catalytic agent in another vessel.

941. Ellis, C. Detoxicating oil and the like. U. S. patent 1132710. 1915. The oil, fat, or the like is exposed to the action of a spent metallic catalyzer in the absence of hydrogen, to remove constituents injurious to metallic catalyzers.

942. ——— Hydrogenating unsaturated organic material. U. S. patent 1138201. 1915. Process comprises adding nickel carbonyl and hydrogen to unsaturated fatty material, heating the mixture to decompose the nickel carbonyl and cause the resulting nickel and the hydrogen to react upon the unsaturated fatty material, and completing the hydrogenation at a lower temperature.

943. ——— Process for adding hydrogen to fatty acids, fatty esters, and other unsaturated compounds. U. S. patent 1154495. 1915. Describes method of treating organic material containing normally liquid or solid unsaturated compounds by thermally decomposing nickel carbonyl in contact with it in the presence of hydrogen.

944. ——— Process for making catalyzers. U. S. patent 1156674. 1915. Pure nickel hydrate dissolved in ammonia is mixed with finely divided charcoal; the mixture is then dried and reduced with a reducing gas.

945. ——— Semireduced hydrogenation catalyzer. U. S. patent 1159480. 1915. Process consists of partly reducing nickel oxide with hydrogen and collecting the product in a sealing liquid.

946. Gray, T. T. Process of treating hydrocarbon oils. U. S. patent 1158205. 1915. Consists in subjecting oil to an oxidizing agent in the presence of ultra violet or active rays.

947. Hennebutte, H. G. Refining petroleum. U. S. patent 1165877. 1915. Relates to certain improvements in refining petroleum, particularly to the removal or elimination of volatile unsaturated hydrocarbons.

948. Lessing, R. Hydrogenation of unsaturated substances. U. S. patent 1162623. 1915. The substance is sprayed into a heated chamber containing a gaseous hydrogenating agent carrying nickel carbonyl. Method and apparatus is described.

949. McElroy, K. P. Hydrogenating process and apparatus. U. S. patent 1157993. 1915. Process comprises maintaining an oily liquid in admixture with a hydrogenating catalyst as an emulsion of gas and liquid by a rapid cyclic circulation of hydrogen through the oil.

950. Matthews, F. E., and Bliss, H. J. W. Manufacture of dihalogen paraffins. U. S. patent 1158524. 1915. Process consists in distilling a mixture containing olefin hydrocarbons and saturated hydrocarbons to obtain a fraction containing chiefly olefin hydrocarbons, and then treating the fraction with only sufficient halogenizing agent to saturate the unsaturated hydrocarbons.

951. Perkin, W. H., Weizmann, Charles, and Davies, Harold. Manufacture of halogen derivatives of organic compounds. U. S. patent 1144237. 1915. The manufacture of dichloro derivatives of paraffin hydrocarbons by causing chlorine to react with vapors of a mono-chlorinated paraffin hydrocarbon, removing the desired halogenated product as it is formed, and subjecting it to fractional distillation.

952. Richardson, W. D. Process of hydrogenating oils or fats. U. S. patent 1151045. 1915. Describes method of mixing oil or fat with electrically disintegrated catalytic metal produced in an organic liquid, treating the mixture with hydrogen, and then removing the disintegrated metal.

953. Sparre, Fin, and Masland, W. E. Apparatus for chlorination. U. S. patent 1148259. 1915. Has an opaque absorption chamber, and a transparent reaction chamber through which a liquid may be passed and the reaction observed.

954. Walker, T. B. Process of hydrogenating fats, oils, and waxes. U. S. patent 1123962. 1915. Consists in spraying the material with hydrogen gas against a heated body of catalytic material in the presence of an electrical discharge.

### SULPHURIC ACID REFINING.

955. Mahr, K. Kontinuierliche und diskontinuierliche Raffination in der Erdölindustrie (Continuous and discontinuous refining in the petroleum industry). Ztschr. angew. Chem., Jahrg. 28, 1915, pp. 20–22. Describes methods for continuous and discontinuous refining of petroleum distillates.

#### Patents.

956. Bending, W. P. Apparatus for drying oils. U. S. patent 1144522. 1915. Oil is agitated with an acid to remove the tarry constituents, neutralized with an alkali, washed to remove the alkali, and freed of moisture.

957. Kendall, E. D. Process of refining hydrocarbons. U. S. patent 1154516. 1915. Refining by means of sulphuric acid and other agents, the object being to provide a time-saving, continuous, and effective process requiring comparatively little mechanical power.

958. ——— Apparatus for refining hydrocarbons. U. S. patent 1154517. 1915. Describes an apparatus for continuous refining by means of sulphuric acid.

### OXIDATION, HARDENING, AND SAPONIFICATION—PATENT.

959. Carron, —. Solidifying petroleum. French patent 475364. 1915.

*See also* No. 938.

### BLEACHING.

960. Ueno, S. The Kambara earth and its bleaching action on oils. Jour. Ind. and Eng. Chem., vol. 7, 1915, pp. 596–600. Describes laboratory experiments with Kambara earth. Effect on bleaching action of impurities in the oils, temperature and duration of treatment, presence of air, hydrogen, and carbon dioxide gas, water, acid, and alkalies were studied.

## PHYSICAL PROCESSES.

### FILTRATION, REFRIGERATION, AND COMPRESSION.

961. Gurwitsch, L. G. Action of Florida earth on unsaturated compounds in petroleum. Jour. Russ. Phys. Chem. Soc., vol. 47, 1915, pp. 827–830: Jour. Chem. Soc., vol. 108, I, 1915, pp. 933–934. Discusses the character of the action of floridin in decolorizing petroleum.

962. Jewell, W. R. Fuller's earth and its importance to refiners. Mine, Quarry and Derrick, vol. 1, 1915, pp. 77–79. Gives analyses of five samples of Fuller's earth and explains its properties and uses, especially in treating lubricating oils; characteristics of lubricating oil before and after treatment are given.

963. Petroleum World. The purification of petroleum and shale oils and waxes by bauxite. Vol. 12, 1915, p. 80. Describes methods used by Burmah Oil Co., Ltd., Rangoon, India, and by Anglo-Persian Oil Co.; patents held by the Oil Refining Improvements Co., Glasgow.

Patent.

964. Hood, J. J., and Salamon, A. G. Treatment of mineral and vegetable oils. U. S. patent 1151523. 1915. Process of decolorizing oil by dissolving it in light petroleum spirit, filtering the solution through material prepared by igniting magnesite to a dull red heat to render it anhydrous, and distilling the filtrate.

965–968. Rassmussen U. Ernst. Vorrichtung zum Reinigen von Oel mit zwangläufiger Zuführung des Öls zu dem Heizaggregate und Anordnung dieses Heizaggregats unmittelbar vor Eintritt des Öls in den Filterapparat. German patent 628059. 1915.

## EXTRACTION.

969. Self, P. A. W. Extraction by immiscible solvents. Pharm. Jour., vol., 95, 1915, pp. 164–165. Discusses the adaptability of a number of solvents, including petroleum ether, and describes methods of preventing and separating emulsions.

Patents.

970. Black, J. C. Refining petroleum. U. S. patent 1152478. 1915. The oil is subjected to the action of sulphur dioxide, or a similar agent, at a temperature and pressure suitable for forming compounds that separate by gravity from the liquid; the compounds are then removed and heated to liberate the sulphur dioxide.

971 ——— Refining petroleum. U. S. patent 1164162. 1915. The oil is treated with $SO_2$ gas under sufficient pressure to separate the oil into two layers, the bottom layer is withdrawn and treated at a lower pressure to separate it into two layers, the first and second top layers go to a common tank where they are freed of $SO_2$, the bottom layer to another tank where it is freed of $SO_2$, the liberated gas being used to treat fresh portions of oil.

972. Mann, F. W., and Chappell, M. L. Process for refining petroleum and its products. U. S. patent 1163025. 1915. Consists in treating such oils with alcohol at a temperature below 32° F., in the presence of liquid sulphur dioxide to obtain the desired low temperature, and in quantity sufficient to dissolve such constituents as need to be removed; and them separating the two resultant liquids.

## EMULSIFICATION—PATENTS.

973. Blichfeldt, S. H. Emulsifying apparatus. U. S. patent 1166319. 1915. Contains a series of rotatory agitating blades mounted on a shaft.

974. Johnson, J. Filter press. U. S. patent 1139767. 1915. A force filter press having collapsible compartments that can be readily dissembled for cleaning.

975. Kirshner, A. S. Machine for extracting oils. U. S. patent 1151798. 1915. Contains a series of compression blocks actuated by weights that are thrown outward by centrifugal force when the system is rotated.

976. Leitch, M., and Wright, B. R. Emulsifier. U. S. patent 1145600. 1915. Is provided with a central chamber having discharge passages tangent to the inner wall and communicating with annular grooves in the wall of the chamber.

977. McHenry, C. Emulsifier. U. S. patent 1154868. 1915. The fluids to be emulsified enter a mixing chamber through diametrically opposed needle valves.

978. Stackpole, J. L. Emulsifier. U. S. patent 1152127. 1915. A pipe with a tapering bore and having a branch outlet between a tapering plug and the adjusting screw, which is threaded into the end of the pipe and holds the plug in place.

979. Vogelsang, J. B. Device for combining and emulsifying substances. U. S. patent 1140548. 1915. Fluid is forced under pressure from a nozzle through a perforated cylinder.

980. ——— Process for combining and emulsifying two or more liquids. U. S. patent 1152453. 1915. The liquid to be emulsified is forced through an inclosed perforated cylinder by means of a steam jet.

### MATERIALS.

*See* No. 962.

## SPECIFIC PRODUCTS AND THEIR MANUFACTURE.

### GASOLINE.

981. Burrell, G. A. The suitability of natural gas for making gasoline. Nat. Gas Jour., vol. 9, 1915, pp. 74–76. Discusses cost and plant operation, with special reference to gas in Wyoming; testing for gasoline content; variation in gas and residual gas.

982. Burrell, G. A., Seibert, F. M., and Oberfell, G. G. The condensation of gasoline from natural gas. Bull. 88, U. S. Bureau of Mines, 1915, 107 pp., 5 pls., 18 figs. Describes growth of industry, methods for condensation, transportation and blending, with reference to lessening waste of gas.

983. Claudy, C. H. Squeezing gasoline from gas. Tech. World Mag., June, 1915, pp. 454–456. Popular explanation of manufacture of gasoline from natural gas, and its uses.

984. Matthews, F. E. Gasoline from natural gas. Ice and Refrig., vol. 49, 1915, pp. 62–64. Waste of gas from wells, growth of industry, and principles pertaining to gasoline recovery.

985. Sarchet, C. M. Casing-head gasoline plants now one of the best means of conservation. Nat. Gas Jour., vol. 9, 1915, pp. 548-549. Shows rapid growth of the industry and its importance in conservation of gas.

*See also* No. 342.

### PATENTS.

986. Goldstein, H. Motor spirit. English patent 21316. 1915. Consists of a mixture of 86 volumes of 95 per cent pure ethyl alcohol and 10 volumes of ether, with or without a denaturing agent such as 1 volume wood spirit and 3 volumes of benzol.

987. Maag, G. C. Apparatus for obtaining liquid hydrocarbons. U. S. patent 1142525. 1915. Describes compressor plant for removing gasoline from natural gas.

988. Schill, Emil. Apparatus for obtaining liquid hydrocarbons. U. S. patent 1142275. 1915. Describes a compression and condensation plant for making gasoline from natural gas.

### LUBRICANTS—PATENTS.

989. Blichfeldt, S. H. Lubricants. English patent 17411. 1915. A lubricant consisting of such an emulsion of 5 to 25 per cent of water or watery solution in 95 to 75 per cent of oil or fat that the aqueous particles have a diameter of 0.001 mm. or less.

990. Pettit, L. D. Lubricant. U. S. patent 1143724. 1915. Lubricating compound consisting of liquid petroleum 42 parts, paraffin wax 25 parts, graphite 2¾ parts, lime water 41 parts, and a mixture of rosin and refined petroleum 14 parts. Crude petroleum 41 parts, and red engine oil 1 part may be substituted for the liquid petroleum.

991. Rice, W. T. Composite lubricating oil. U. S. patent 1163856. 1915. Composition consisting of castor oil, rape seed oil, and paraffin oil, in the approximate proportions of 60, 15, and 25 per cent.

992. Rosen, Jean. Process of the manufacture of lubricating oils and the like. U. S. patent 1165909. 1915. Consists in heating petroleum residue to about 320° C., and then introducing solar or cracked oil to be vaporized by the heated material and serve as a carrier for the distillate from it.

993. Wade, Harold. Lubricants. English patent 18235. 1915. Consists of mineral oil, set by milk of lime or other alkali, and the acid body obtained from resin distilled under pressure or with superheated steam.

994. Warrell, A. Lubricant and process of making same. U. S. patent 1133204. 1915. Process comprises prolonged agitation of a comminuted soapstone mineral, such as asbestos, in lubricating oil until a permanent magma is formed.

### PARAFFIN.

995. Grempe, P. M. Recovery of paraffin from bleaching earth. Seifenfabrikant, Jahrg. 35, 1915, p. 7345. About 30 to 40 per cent of paraffin is now recovered by extraction.

*See also* Nos. 803, 806.

### PATENT.

996. Opl, K. Process for the fractional separation of paraffin and like substances and of mixtures of such substances with oil. U. S. patent 1128494. 1915. The material is melted and then rotated in a cylinder with a vertical shaft while cooling. The paraffin crystals gradually settle to the bottom, forming a spongy layer. The oil and soft paraffin are then filtered through this layer.

### ASPHALT.

997. Ekstrand, C. Asphalt, its history, manufacture, and uses. Paper read before the Brooklyn Engineers Club, May 13, 1915.

998. Goldsmith, W. Operating Manhattan asphalt plant. Munic. Jour., vol. 39, 1915, pp. 771–773. Describes plant and work done during fiscal year.

### PATENT.

999. Forrest, C. N. Manufacture of asphalt cement from natural asphalts. U. S. patent 1163593. 1915. Process consists of refining crude asphalt in the presence of a sulphur-absorbing oil to retain the sulphur in the asphalt, sufficient oil being added to obtain the required consistency.

## FIRE HAZARDS.

*See* No. 600.

## RECORDS AND STATISTICS.

1000. Dunham, W. M. Comprehensive review of oil refining conditions. Oil and Gas Jour., vol. 13, Apr. 22, 1915, p. 8. Gives production of oil east of Mississippi River, 1910 to 1914; need of Oklahoma crude by eastern refineries.

1001. James, H. G. Comprehensive view of oil refining conditions. Oil and Gas Jour., vol. 13, Apr. 8, 1915, pp. 16–18; no. 45, 1915, pp. 8–9. Reviews industry in Mid-Continent field; gives statistics for refineries and distributing stations, pipe lines, amount of oil inspected in Kansas and Oklahoma, 1914, and daily production in Oklahoma.

1002. Flachs, A. Germany's search for motor spirit. Petroleum World, vol. 12, 1915, pp. 561–564. Describes attempt to make spirit from bitumen and bituminous shales; characteristics of bitumen given; artificial petroleum obtained which yielded on distillation 18.8 per cent of spirit; high percentage of unsaturated hydrocarbons found, but recovery means heavy loss of material.

1003. Wolf, R. M. Tar and crude petroleum; a review of patents for the last eight years. Chem. App., Jahrg. 2, 1915, pp. 259–261, 284–285. German patents on distillation; gasifying; removing paraffin, water, salt solutions, emulsions, etc.

## CONSTRUCTION AND EQUIPMENT.

1004. Practical Engineer. Power in a petroleum refinery. Vol. 19, 1915, pp. 293–296. Describes plant at Whiting, Indiana, where steam is carried to engines one-half mile from boiler plant.

### PATENT.

1005. Burton, W. M. Method of safeguarding stills. U. S. patent 1169689. 1915. Consists in venting the escaping gases into a chamber of sufficient capacity to permit of their expansion and cooling to a temperature well below the ignition point of the most inflammable gaseous constituent.

## MISCELLANEOUS.

1006. Oildom. Peat a petroleum substitute in England. Vol. 5, December, 1915, pp. 188, 212. Report of discovery of new process for distillation of peat, by which fuel, coke, toluol, ammonia, paraffin wax, and acetone are obtained in good quantity and high grade.

### PATENTS.

1007. Bell, T. Automatic time check for oil presses and other machines. U. S. patent 1139251. 1915. A recording tape with a marker, operated by an electrical device.

1008. French, A. W. Oil-expressing apparatus. U. S. patent 1158797. 1915. A heater with a movable spout and press-charging device that can be swung about to discharge into any one of a number of presses arranged about it.

1009. Kaiser, P. G., and Reuter, B. E. Apparatus for treating fats and oils. U. S. patent 1156905. 1915. A tank in which the material to be treated is agitated by a jet of live steam. The treating agent is fed through a pipe in which the steam jet is placed.

1010. Whitmore, S. W. Separation of hydrocarbon oils. Canadian patent 165359. 1915. Naphthalene is added to the hydrocarbon and the resultant mixture is distilled.

## UTILIZATION.

1011. Bell, E. C. Ancient use of petroleum. Oil and Gas Jour., vol. 14, Sept. 16, 1915, p. 23. Refers to translation of first written and printed account of petroleum production and use.

1012. Northrop, J. D. Petroleum and its uses. Oildom, vol. 5, November, 1915, pp. 147–152; Petroleum Rev., vol. 33, 1915, pp. 405–406, 427. Paper read before Oil and Gas Producers' Association of West Virginia, Aug. 28, 1915. Discusses industrial, domestic, and medicinal uses of petroleum and its products.

*See also* Nos. 7 and 9.

## LIGHT.

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## HEAT AND POWER.

1014. Bachman, U. Fuel-oil burning. Prac. Eng., vol. 19, 1915, pp. 624–626. Theory of process and description of operation.

1015. Delaney, C. H. Oil-burning stand-by plants. Jour. Elec. Power and Gas, vol. 34, 1915, pp. 528–529, 543–545; West. Eng., vol. 6, 1915, pp. 24–28. Explains function of three classes of stand-by plants and presents valuable suggestions regarding recent practice in fuel-oil burning; operative details given of three typical stations and analysis of cost.

*See also* No. 532.

### STEAM RAISING.

#### ON LOCOMOTIVES.

1016. Bean, G. M. Fuel oil for locomotives. Rwy. Rev., vol. 56, 1915, pp. 725–726; Petroleum Rev., vol. 33, 1915, pp. 93–96. Paper read before International Railway Fuel Association. Discusses combustion of fuel oil in comparison with other fuels; designs for burners and furnaces are given.

1017. Canadian Engineer. Fuel oil for locomotive use. Vol. 29, 1915, pp. 159–161. Discusses furnace design and oil-storage tanks.

1018. Gibbings, A. H. Oil-fuel equipment for locomotives and principles of application. London, Oil Publishing House, 1915, 136 pp. Discusses principles of combustion, methods of burning fuel oil, pressure, burners, evaporative capacity, and heating surface, etc.

1019. LeGrand, L. G. Fuel-oil installations on the Grand Trunk Pacific. Rwy. Rev., vol. 56, 1915, pp. 828–831. Paper read before Western Canadian Railway Club. Describes facilities for receiving, storing, distributing, and issuing oil.

#### ON SHIPS.

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1021. Cone, H. I. Fuel oil in United States Navy. Canadian Min. Jour., vol. 36, 1915, pp. 372–373. Compares advantages of oil with coal.

1022. La Nature. La chauffe au pétrole dans la marine (Burning of petroleum in ships). Vol. 43, 1915, pp. 233–239. Use of oil-burning engines in ships and advantages.

1023. Peabody, E. H. Oil fuel. Trans. Internat. Eng. Cong., 1915, Naval Architecture and Marine Engineering, Paper 214, pp. 466–596; discussion, pp. 596–598. Detailed account of oil discovery and use as fuel; statistics on oil tankers and equipment; discusses storage, furnaces, and boiler tests; increase in use of heavier oils and boiler of higher capacities.

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1024. Burr, R. B. The use of natural gas at domestic rates for industrial purposes. Proc. Nat. Gas Assoc. of Am., vol. 7, 1915, pp. 60–73. Discusses application of gas to industrial appliances; competition of natural gas with other fuels.

1025. Dunn, F. B. Industrial uses of fuel oil. Jour. Elec. Power and Gas, vol. 34, 1915, pp. 106–108, 146, 188, 232, 250, 275, 297, 317. Discusses oil as fuel in various industries.

1026. Herington, C. F. Economy of oil and gas fuels compared. Gas Age, vol. 36, 1915, pp. 302–304. Gives cost of data for oil and gas plants; concludes that operating cost of gas plants is less than that of oil plants.

1027. Natural Gas Journal. Progress in fuel development. Vol. 9, 1915, pp. 17–40. Describes numerous industrial appliances and uses of artificial gas.

1028. Schmitt, R. Industrial oil-firing installations. Feuerungstechnik, Jahrg. 3, 1915, pp. 257–261, 272–276. Discusses methods of oil firing, describes types of construction, and furnaces used, and gives data on comparative costs of firing oil and coal.

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1030. Cone, E. F. Liquid fuel for foundry cupola. Iron Age, vol. 95, 1915, pp. 1058–1059. Discusses use according to Stoughton patent, cost reduction, and increased rate of melting.

1031. Hutchinson, F. R. Thirty-cent natural gas melts brass for half the cost of free coke. Proc. Nat. Gas Assoc. of Am., vol. 7, 1915, pp. 104–126; discussion, pp. 127–129. Results of tests in Cleveland foundries; explains construction of furnace. Eighty-five per cent of brass melting in Cleveland has been done successfully with gas for nearly two years; tables of cost data for melting with coke and with gas are given.

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1033-1034. Wolf, F. L., and Burr, R. B. Tests of natural-gas fired brass-melting furnaces under factory-operating conditions. Proc. Nat. Gas Assoc. of Am., vol. 7, 1915, pp. 74–93; discussion, pp. 93–104. Results of tests made on various types of furnaces at plant of the Ohio Brass Co. described.

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1035. Weitlaner, R. J. Comparative furnace efficiency. Met. and Chem. Eng., vol. 13, 1915, pp. 357–331. Cost of fuel given and data comparing furnaces fired with coal, producer gas, oil, wood, electric power.

*See also* No. 1028.

## INTERNAL-COMBUSTION ENGINES (THEORY AND USES).

1036. Bruhn, K. Das Naphtalin und seine Verwendung insbesondere als Treibmittel für Explosions-Kraft-maschinen (Naphthalene and its application as a fuel for explosion engines). Jour. Gasbel., Jahrg. 58, 1915, pp. 579–582, 592–595. Discusses use of naphthalene as a fuel for explosive engines, types of engines, tests, and costs.

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1038. Dyke, A. L. Dyke's motor manual. St. Louis, 1915, 216 pp. A practical treatise on motor cycles, marine engines and motor boats, stationary gasoline, kerosene oil, aero, and steam engines.

1039. Ehle, A. H. Oil or gasoline locomotives to supplant steam locomotive. Extracted in Nat. Petroleum News, vol. 6, January, 1915, pp. 55–57. Paper read before Society of Automobile Engineers, Jan. 6–7, 1915. Discusses future use of internal-combustion engines, first cost and fuel for engines, and expansion of present types for heavy passenger and freight work.

1040. Lucke, C. E. The internal-combustion engine of the year 1915; a survey of its status. Trans. Internat. Eng. Cong., 1915, Mechanical Engineering, paper 122, pp. 187–267. Discusses in detail engines and types, with statistics of production, consumption, and distribution of fuels.

1041. National Petroleum News. Aviation to bring new gasoline market. Vol. 7, November, 1915, pp. 44, 46–47. Types of aeroplane engines described and illustrated.

1042. ——— Motor boats furnish new oil market. Vol. 7, September, 1915, pp. 70, 72. Demand for motor boats discussed, also fuel and types of engines.

1043. ——— Problems faced by makers of aeroplane engines. Vol. 7, October, 1915, pp. 38–39. Describes requisites for good engines, fuel consumption, and quality of lubricating oils.

1044. Petroleum World. Remarkable overload tests of a British oil engine. Vol. 12, 1915, pp. 307–308. Describes tests on opposed piston marine oil engine Mexican crude oil of 0.950 specific gravity was successfully used without pilot or preignition.

1045. Rappaport, F. G. The internal-combustion engine in the oil fields. Jour. Inst. Petroleum Tech., vol. 1, pt. 4, 1915, pp. 195–214; discussion, pp. 214–227; Petroleum Rev., vol. 32, 1915, pp. 315–316, 335–336; Petroleum World, vol. 12, 1915, pp. 189–196. Discusses advantages and defects of different forms of power; steam, electricity, oil, and gas engines.

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1048. Wimperis, H. E. The internal-combustion engine. New York, D. Van Nostrand Co., 1915, 308 pp. A textbook for students and engineers.

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**1049.** Clerk, D. Gaseous explosions. Engineering, vol. 98, 1915, pp. 140-141, 168-170. Deals with combustion in gas engines.

**1050.** Elektrotechnische Rundschau. Oil and suction producer gas engines for ship propulsion. Jahrg. 32, Nos. 30, 31, 1915; Jour. Am. Soc. Mech. Eng., vol. 37, 1915, p. 602. Compares Diesel engines and producer gas engines.

**1051.** Hopkinson, B. Gaseous explosions. Engineering, vol. 99, 1915, p. 200. Discusses the theory of combustion in gas engines.

**1052.** Texaco Star. Comparative test on Snow gas engine and compressor at a large gas company's plant in Texas. Vol. 2, June, 1915, pp. 16-18. Details and results of tests given.

*See also* No. 1065.

## GASOLINE ENGINES.

**1053.** Brewer, R. W. A. Running costs of motor vehicles. Trans. Soc. Eng., 1915, pp. 51-65; discussion, pp. 65-80.

**1054.** Colliery Engineer. Gasoline mine haulage as compared with mule haulage. Vol. 35, 1915, pp. 547-548. Compares cost of coal transportation with mules and with a gasoline locomotive.

**1055.** Davis, F. S. Motor tractors. Trans. Internat. Eng. Cong., 1915, Mechanical Engineering, pp. 506-532. Discusses influence of fuel on motor tractor development and fuel consumption.

**1056.** Hobbs, G. W., and Elliott, B. G. The gasoline automobile. New York, McGraw-Hill Book Co., 1915, 253 pp. Discusses construction of engines, power-plant groups, and transmission systems, fuels, carbureting systems, etc.

**1057.** Hood, O. P., and Kudlich, R. H. Gasoline mine locomotives in relation to safety and health. Bull. 74, U. S. Bureau of Mines, 1915, 83 pp., 3 pls., Methods of handling gasoline underground; amount of exhaust gases permissible from locomotives; care of engines, etc.

**1058.** Kean, F. J. The petrol engine. New York, Spon and Chamberlain, 1915, 140 pp. Discusses carburation, lubrication, and liquid fuel and their requirements.

**1059.** Petroleum Age. The "Flywheel" to the petroleum industry. Vol. 2, April, 1915, pp. 9-12. Development of the petrol-driven motor vehicle.

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**1060.** Crowley, R. W. The Diesel-type engine in the United States. Elec. World, vol. 65, 1915, pp. 412-414, 665-667. Remarks on slow adoption and the promising future of high-economy oil engines.

**1061.** Davison, G. C. The application of Diesel or heavy-oil engines to marine propulsion. Trans. Internat. Eng. Cong., 1915, Nav. Arch. and Marine Eng., paper 215, pp. 599-616. History of Diesel engines, advantages and uses; cost of steam and Diesel engines.

**1062.** Dingler's Polytechnisches Journal. Grosse Dieslemaschinen. Bd. 330, 1915, pp. 34-35; Oelmotor, Jahrg. 3, 1915, p. 471. Use of Diesel engines on ships, fuel consumption, etc.

**1063.** Goldingham, A. H. Marine and stationary Diesel engines. New York, Spon and Chamberlain, 1915, 206 pp. Engines described and illustrated, with instructions for installation; description of fuel.

**1064.** Howell, J. B. Report on test of Diesel engine plant of the National Ice & Cold Storage Co., San Francisco, Cal. Jour. Am. Soc. Naval Eng., vol. 27, 1915, pp. 210-213. Test to verify rate of fuel consumption.

**1065.** Howell, S. M. Development of the crude oil engine. Prac. Eng., vol. 19, 1915, pp. 968-970, 1049-1051, 1140-1142. Discusses Diesel system and use of crude oil, also discusses Weiss gas engine.

**1066.** Kloos, C. The Diesel engine applied to marine purposes. Trans. Internat. Eng. Cong., 1915, Naval Architecture and Marine Engineering, paper 216, pp. 617-651; Power, vol. 42, 1915, pp. 734-738. Gives designs and construction details of engines, oil consumption and characteristics of oils.

**1067.** Lees, S. The effect of variation of specific heat with temperature on the theoretical efficiency of the Diesel engine. Engineering, vol. 99, 1915, pp. 1-2. Gives calculations on variation of specific heat in the cycle.

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**1069.** National Petroleum News. Oil engine may revolutionize shipping. Vol. 7, July, 1915, pp. 66-67. Advantages of new valveless type of Diesel engine.

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**1071.** Percy, E. N. The operation of a marine Diesel engine. Int. Marine Eng., vol. 20, 1915, pp. 209-211. Discusses details of operation, inspection, care, etc., of the engine.

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**1073.** Schmidt, H. Dieselmotor mit Teeröl-etrie (Diesel engines run with tar oil). Elektrotechnik und Maschinenbau, Jahrg. 33, 1915, pp. 277-282; Petroleum Ztschr., Jahrg. 11, 1915, pp. 160-163; Elec. World, vol. 65, 1915, p. 991. Discusses possibilities of use of tar oil for the Diesel engine.

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*See also* Nos. 1077 and 1078.

### MISCELLANEOUS HEAVY OIL ENGINES.

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**1078.** Junge, F. E. The Junkers oil engine. Jour. Am. Soc. Naval Eng., vol. 27, 1915, pp. 205-210. Advantages of engine and table showing results of fuel consumption trials.

## CARBURETORS.

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## PATENTS.

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1088. Abernethy, E. F. Carburetor for internal combustion engines. U. S patent 1137727. 1915. A partial vacuum maintained in the carbureting chamber, corresponding to a suction draft, draws fuel into the chamber and regulates the rate of feed.

1089. ——— Carburetor or vaporizer for explosive engines. U. S. patent 1137728. 1915. Principal feature is a float valve for maintaining a constant head of fuel in the feed chamber.

1090. Ahlberg, G. A. F. Carburetor. U. S. patent 1138829. 1915. Device has two mixing chambers The flow from the primary into the secondary chamber is caused by suction.

1091. Allen, H. W. Carburetor. U. S. patent 1140232. 1915. Fuel supply is controlled by a needle valve operated by two cylindrical dampers.

1092. Alley, M. W. Carburetor. U. S. patent 1163581. 1915. Carbureting chamber contains two frusto-conical compartments with their apex ends toward each other, each containing a deflector of similar shape. Air is admitted directly to one of these compartments and a vacuum is maintained in the other; the fuel discharges through an annular nozzle.

1093. Babbitt, M. E., and Beaumont, J. F. Carburetor. U. S. patent 1133452. 1915. Exterior casing has a hollow boss containing a resistance coil.

1094. Barnes, L. T. Carburetor. U. S. patent 1134365. 1915. Principal feature is a Venturi tube arrangement for regulating the air and fuel supply.

1095. ———. Carburetor. U. S. patent 1134366. 1915. Within the fuel chamber is a device for providing a thin annular fuel head; a vertical duct receives fuel from near the upper level in this chamber and delivers it to the Venturi tube to mix with air. The fuel chamber, duct, and tube are inclosed in a heating jacket.

1096. Bates, M. F. Carburetor. U. S. patent 1160239. 1915. Has two intake passages with a port between each intake and the outlet; the opening of each port is regulated by a disk valve, the disks being joined so that the ports operate simultaneously.

**1097.** Beamer, W. D. Carburetor. U. S. patent 1161437. 1915. Chief feature is a Venturi tube, the throat area of which is regulated by means of a grooved roller lying at one side of the nozzle; means are also provided for controlling the area of the throttle end of the tube.

**1098.** Beamer, W. D., and Duffy, J. F. Carburetor. U. S. patent 1131312. 1915. The casing contains a Venturi tube, the throat area of which is regulated by two rollers and a spray nozzle between the rollers. Means for regulating the throttle end are also provided.

**1099.** Beck, M. Heavy-oil carburetor for explosive engines. U. S. patent 1149710. 1915. Principal feature is a thermoelectric system for regulating air and fuel feed.

**1100.** Bell, E. J. Carbureting device. U. S. patent 1163059. 1915. Air under pressure meets the fuel oil and atomizes it; suitable devices are provided for controlling the supply of fuel and air.

**1101.** Bennett, A. C. Carburetor. U. S. patent 1123469. 1915. A vertical pipe has a series of apertures in it, from each of which the oil discharges between two spreader fins or plates and forms a thin film. Cross currents of air strike the edges of the films of oil and vaporize it.

**1102.** ———. Carburetor. U. S. patent 1130700. 1915. The delivery pipe contains a horizontal oil-feed pipe perforated along the top, each aperture having a pair of plates or fins to spread the oil into a thin film. The air enters the delivery pipe below the feed pipe and strikes the film of oil.

**1103.** ———. Carburetor. U. S. patent 1133527. 1915. The exhaust gases are utilized to heat the fuel oil and the vaporizing chamber.

**1104.** ———. Carburetor manifold. U. S. patent 1133528. 1915. Consists of a series of upwardly curved delivery pipes containing shelves to retard the downward flow of condensation products.

**1105.** ———. Carburetor. U. S. patent 1136997. 1915. Has a central admission opening and a vertical oil-feed pipe, the pipe and opening being surrounded by an evaporator consisting of a series of annular plates laid one upon the other, through which the oil and air passes.

**1106.** Bessom, E. A., and Anderson, R. M. Carburetor. U. S. patent 1134942. 1915. Chief features are an air passage containing a throttle and a fuel nozzle, this passage being connected, on the engine side of the throttle, with the top of the fuel reservoir. When the throttle is closed it closes this auxiliary passage.

**1107.** Beucus, T. Carburetor. U. S. patent 1126690. 1915. Comprises a vertical cylindrical casing with lateral fuel and air inlets at the bottom, a nozzle surrounded by an adjustable housing, a disk carrying a valve to close the nozzle, and a hand regulated needle within the nozzle.

**1108.** Biays, B. H. Carburetor. U. S. patent 1166173. 1915. Mixing chamber is heated and water jacketed, and has an annular air inlet closed by a valve with a central bore having a series of auxiliary air conduits and a series of fuel conduits at right angles to the central bore.

**1109.** Bingaman, W. O. Carburetor. U. S. patent 1151156. 1915. Flow of fuel is controlled by valve actuated by engine governor.

**1110.** Bjorklund, R. Carburetor. U. S. patent 1161374. 1915. Air is admitted through a fixed opening having a nozzle adjusted to admit a definite supply of gasolene, and through an auxiliary air inlet with a valve which regulates the flow of gasolene.

**1111.** Blomquist, J. O. Carburetor. U. S. patent 1157363. 1915. Fuel chamber has a float valve for keeping the oil at a fixed level, and an auxiliary fuel chamber with a needle valve controlling the admission of fuel from the main chamber.

**1112.** Bourne, T. F. Carburetor. U. S. patent 1158435. 1915. Carbureting chamber contains a number of air passages and fuel jets.

**1113.** Breath, W. L. Carburetor. U. S. patent 1153891. 1915. Chief feature is a graduating valve, actuated by changes in rapidity of flow of fuel, that automatically regulates the flow.

**1114.** Breeze, G. A. Carburetor. U. S. patent 1159167. 1915. Has a rotable feed tube with a central passage for air and a number of fuel inlets in the wall. The tube acts as an atomizer and also regulates the oil feed.

**1115.** Brown, G. M. Carburetor. U. S. patent 1151159. 1915. Has a spherical mixing chamber; the fuel duct enters at one side between the air inlet and mixture delivery duct; the latter two contain throttle valves.

**1116.** Brush, A. P. Carburetor. U. S. patent 1130474. 1915. Has a number of fuel feed orifices arranged about a suction-operated, hollow air valve.

**1117.** Buick, D. D. Carburetor. U. S. patent 1162680. 1915. Has a pivoted shutter controlling the air admission and a tubular piston valve in the fuel inlet having several perforations adapted to be successively opened into the carbureting chamber. The shutter operates the piston valve and automatically regulates the flow of fuel.

**1118.** Burnham, T. J. Carburetor. U. S. patent 1160837. 1915. Contains an annular conduit above a heater, a series of inwardly pointing nozzles connected with the conduit, and a fuel pipe leading to the conduit.

**1119.** Butler, C. C. Gas producer for explosive engines. U. S. patent 1152003. 1915. A removable gasifying cylinder head containing a gasifying chamber, connected with a carburetor, and a reserve-supply chamber, the two chambers being connected by means of a port controlled by valves.

**1120.** Cadett, J. W. T. Carburetor. U. S. patent 1165224. 1915. A spray carburetor having a single air duct with a fuel nozzle in it and a throttle to control the mixture of air and fuel.

**1121.** Carpenter, J. C. Carburetor. U. S. patent 1153999. 1915. The air enters the carbureting chamber with a whirling motion, causing the fuel to spray; a flange on the wall retards the descent of liquid particles.

**1122.** Carrel, C. M. Pressure carburetor. U. S. patent 1157146. 1915. Sprayer consists of three concentric nozzles. The fuel is fed from a tank under pressure through the intermediate and inner nozzles; air under pressure is admitted from the fuel tank to the outer nozzle.

**1123.** Carter, W. C. Needle-valve operating mechanism for carburetors. U. S. patent 1124697. 1915. Has a needle fuel valve that is controlled by the movement of a throttle valve.

**1124.** Cerny, Alois. Carburetor. U. S. patent 1157507. 1915. Has a combined spraying nozzle and valve.

**1125.** Christian, Gilbert. Carburetor. U. S. patent 1166112. 1915. The cylindrical fuel nozzle has an annular discharge opening and a second and a third series of openings at a point somewhat above the annular discharge. A movable throttle valve with a flaring lower end incloses the nozzle.

**1126.** Corbett, C. A. Carburetor. U. S. patent 1163393. 1915. Has two carbureting chambers with outlet valves operated by a pair of shafts; the valve of one of the chambers can not be opened when the other valve is open.

**1127.** Coulter, H. M. Carburetor. U. S. patent 1125069. 1915. Fuel inlet consists of a perforated pipe with a rotable sleeve fitting over it.

**1128.** Cox, Arthur. Carburetor. U. S. patent 1143511. 1915. Has an adjustable regulating sleeve combined with a Venturi-type choke tube and a fuel needle valve.

**1129.** Cummings, C. W. Carburetor. U. S. patent 1129794. 1915. Heats the fuel before carburation.

**1130.** Cunningham, W. J. Carburetor. U. S. patent 1162041. 1915. Contains a series of independent carbureting tubes, each having an air inlet and a fuel nozzle.

1131. Dayton, J. M. Carburetor. U. S. patent 1139851. 1915. Throttle valve and air valve are regulated by an arm fixed to one of the valves and having a sliding connection with the other.

1132. Delaunay-Belleville, R. Carburetor. U. S. patent 1130490. 1915. Has an air conduit into which two jets of fuel are directed, one in the same and one in the opposite direction to the flow of air.

1133. Deppe, W. P. Carburetor. U. S. patent 1163223. 1915. Has a Venturi tube in the lower part of the mixing chamber, a fuel nozzle in the tube, and a throttle valve above the tube.

1134. Diener, C. H. Carburetor. U. S. patent 1156836. 1915. The air and fuel supply are heated by the exhaust gases from the engine.

1135. Dougan, J. L. Carburetor. U. S. patent 1155407. 1915. Has a fuel supply pipe within an air-supply pipe, a piston valve for controlling the fuel feed, a steam generator connected to the air pipe, and an annular valve between the pipes and connected to the piston valve, so that the two valves operate in unison.

1136. Dressel, J. Floatless carburetor. U. S. patent 1126159. 1915. Contains a vacuum operated plunger.

1137. Duryea, J. F. Carburetor. U. S. patent 1135270. 1915. Air valve and fuel valve are actuated by a pivotally mounted lever connected to both valves and operated by a thermostatic device.

1138. Edens, H. N. Carburetor. U. S. patent 1137307. 1915. Has a Venturi tube, and port valves for regulating air admission.

1139. Eiker, T. B. Carburetor. U. S. patent 1132314. 1915. Has a rotary butterfly valve for controlling the passage of the fuel mixture and a valve mechanism for regulating the fuel feed.

1140. Entz, J. B. Carburetor. U. S. patent 1151578. 1915. Has a vertical hollow throttle valve.

1141. Erickson, O. G. Device for supplying heated air to carburetors. U. S. patent 1141450. 1915. Has a detachable casing for placing about a carburetor a heating jacket to be placed about the exhaust manifold of a gas engine, a pipe connecting the casing and the jacket, and a relief valve.

1142. Falk, H. W., and Andrew, W. K. Carburetor device. U. S. patent 1146316. 1915. A liquid reservoir containing two chambers separated by a perforated partition, with an adjustable sleeve in the perforation.

1143. Farrell, A. W. Carburetor. U. S. patent 1123508. 1915. Fuel valves are controlled by a governor.

1144. Folberth, F. G. Carburetor. U. S. patent 1138204. 1915. Has a float chamber, and air valves connected by a system of levers.

1145. Francisco, L. M. Carburetor. U. S. patent 1130502. 1915. Has a thermo-electric device for heating the fuel.

1146. Fulton, W. M. Carburetor. U. S. patent 1145476. 1915. Air supply is maintained at a predetermined temperature and the fuel feed is controlled by a thermosensitive device in the path of the carbureted air.

1147. Funderburk, O. C. Carburetor. U. S. patent 1151778. 1915. Has a siphon arrangement for feeding fuel, operated by the suction of the engine.

1148. ——— Carburetor. U. S. patent 1159005. 1915. Has a device controlled by the air inlet valve for varying the fuel feed, and a device for temporarily increasing the feed of oil on the sudden opening of the air valve.

1149. Gallagher, R. W. Carburetor. U. S. patent 1148485. 1915. Float chamber and Venturi tube are connected by a single passage. Independent by-pass ducts connecting the passage and tube contain high-speed and low-speed valves to control the flow of fuel.

1150. ——— Carburetor. U. S. patent 116 749. 1915. Fuel valve is regulated by a sliding air valve actuated by a suction valve mounted in the opening to the engine.

**1151.** GARDNER, L. S. Visible carburetor. U. S. patent 1146150. 1915. Contains a carbureting unit having a series of transparent tubes

**1152.** GENTLE, W. M. Carburetor. U. S. patent 1124724. 1915. Contains a gas generator, heated from the engine, for gasifying the fuel. Has an auxiliary electric heater for starting a cold engine.

**1153.** GOLDBERG, J. S. Carburetor. U. S. patent 1128773. 1915. The air and fuel supply is regulated by auxiliary valves.

**1154.** ——— Carburetor. U. S. patent 1145138. 1915. The feed of fuel is controlled by a spider mounted in an auxiliary air inlet tube.

**1155.** GOUDARD, M., AND MENNESSON, M Carburetor. U. S. patent 1149908. 1915. Contains a constant-level chamber communicating with a well; the fuel feed is regulated by a float valve that rises and falls with the level of the fuel in the well, which varies in proportion to the velocity of the engine.

**1156.** GRAPIN, ALFRED, AND GRAPIN, LUCIEN. Carburetor. U. S. patent 1148378. 1915. Contains a vertical socket having a number of channels to admit the fuel, the extent of the openings being controlled by movable rings.

**1157.** GREINER, F. Carburetor. U. S. patent 1153487. 1915. Has an auxiliary mixing device which regulates the fuel and air supply.

**1158.** GRIFFIN, GEORGE. Carburetor. U. S. patent 1147949. 1915. Has a butterfly throttle valve for regulating the air and fuel supply.

**1159.** GROVE, J Carburetor. U. S. patent 1159933. 1915. Contains a primary electric heater and a secondary exhaust heater.

**1160.** HAAS, C. A. Carburetor. U. S. patent 1129864. 1915. The rotary throttle valve has a crimped deflector against which a jet of fuel from an aspirator impinges, the flow from the aspirator being controlled by the movement of the valve.

**1161.** HABERKORN, T. H. Gaseous fuel heater and mixer for internal-combustion engines. U. S. patent 1143902. 1915. Contains a system of pipes for heating the fuel before delivery to the mixing chamber.

**1162.** HAEGELE, T. Carburetor. U. S. patent 1152173. 1915. Has an auxiliary air tube fitted with a perforated hood and a slide valve.

**1163.** HAGAR, F. W. Carburetor. U. S. patent 1155232. 1915. Has an automatic spray head.

**1164.** HALLIDAY, T. E. Heavy oil carbureting system for internal-combustion engines. U. S. patent 1137057. 1915. In this apparatus air is mixed with the fuel, the mixture vaporized by heating, and moisture added.

**1165.** HARROUN, R. W. Carburetor. U. S. patent 1135689. 1915. A diaphragm valve in the auxiliary air inlet regulates the fuel supply.

**1166.** ——— Carburetor. U. S. patent 1155726. 1915. Has a device for heating the fuel and air by an auxiliary heating fluid.

**1167.** ——— Carburetor. U. S. patent 1158494. 1915. The heating chamber is heated by the engine exhaust.

**1168.** HART, C. W. Carburetor. U. S. patent 1137135. 1915. Provided with three passages between air inlet and mixing chamber, means for admitting liquid fuel to one passage, water to another, and for controlling the passage of air through the third.

**1169.** HARTSHORN, C. W. Carburetor. U. S. patent 1127992. 1915. Has two air inlets with valves, and an auxiliary air inlet in which the fuel tube is placed.

**1170.** HATFIELD, C. B. Fuel-mixing device for internal-combustion engines. U. S. patent 1131371. 1915. Outlet pipe to the engine contains a number of baffle rods to intercept and nebulize globules of fuel.

**1171.** HATHCOCK, A. G. Carburetor. U. S. patent 1125525. 1915. Has a tubular valve to regulate supply of fuel.

**1172.** HAYNES, C. B. Carburetor. U. S. patent 1143961. 1915. Has a float chamber, a device for atomizing the fuel, and an air-moistening chamber.

**1173.** Hazen, J. D. Carburetor. U. S. patent 1132580. 1915. Has a device for adding water to the air feed.

**1174.** Heath, F. A. Mixing device. U. S. patent 1153915. 1915. Contains a fan placed between screens, for mixing the air and fuel supply to hydrocarbon engines.

**1175.** ——— Mixing device for fluids. U. S. patent 1165875. 1915. A vaporizing and mixing device consisting of a telescoping sleeve containing a helical deflector, adapted to being placed in the inlet pipe of an explosive engine.

**1176.** Heinze, J. O. Carburetor. U. S. patent 1150115. 1915. Has a centrifugal ejector, rotated by means of the air feed, for feeding the oil. The oil is heated as it passes through the ejector.

**1177.** Heitger, F. H. Carburetor. U. S. patent 1132934. 1915. Has a fuel needle valve regulated by a piston valve operated by the suction of the engine.

**1178.** ——— Carburetor. U. S. patent 1134531. 1915. Has an auxiliary air inlet through which the flow of air is controlled by means of a rocking shaft.

**1179.** ——— Carburetor. U. S. patent 1134532. 1915. Has an auxiliary air inlet through which the flow of air is controlled by a lever.

**1180.** Hertzog, O. S. Carburetor. U. S. patent 1141796. 1915. Carbureting chamber contains an inverted conical screen.

**1181.** Hiddleson, P. G. Carburetor. U. S. patent 1123876. 1915. Has a hollow shaft and propeller arrangement for mixing the air and fuel. The feed is regulated by a governor carried by the propeller shaft and connected to the needle valve in the shaft.

**1182.** Higgins, W. H. C. Carburetor. U. S. patent 1154630. 1915. Mixing chamber contains a series of cylinders with registering ports controlled by the movement of the cylinders, and a discharge port controlled by a single movable cylinder.

**1183.** ——— Carburetor. U. S. patent 1157868. 1915. Has a manifold through which the carbureting chamber discharges, and a fuel pump.

**1184.** Hodges, F. W. Carburetor. U. S. patent 1159029. 1915. Fuel feed is regulated by a metering pin normally controlled by the air valve, but on sudden opening of the air valve a dash pot adjusts the pin to quickly increase the flow of fuel.

**1185.** Houghton, J. C., and Hill, L. A. Carburetor. U. S. patent 1164093. 1915. Has a rotary pump for forcing fuel into the mixing chamber under pressure, and a pressure regulating valve for returning excess fuel oil to the fuel reservoir.

**1186.** Howe, F. S. Carburetor. U. S. patent 1126218. 1915. Has a superheating mixing chamber.

**1187.** Huskisson, P. W. Carburetor. U. S. patent 1157541. 1915. An air valve with a groove in it directs the air over the fuel-jet nozzle at an acute angle with the bottom of the spraying chamber.

**1188.** Huszár, G. G. Carburetor. U. S. patent 1146625. 1915. Air supply blows through a chamber containing a block of absorbent material kept saturated with fuel oil.

**1189.** Hutchinson, P. Carburetor. U. S. patent 1136675. 1915. A carburetor for heavy oils, contains a heating chamber and a condenser for removing the heavier vapors and returning the condensation products to the heating chamber.

**1190.** Javal, E. C. Hydrocarbon nozzle of spray carburetors and spray burners. U. S. patent 1132539. 1915. Is cylindrical and contains a number of flexible strands.

**1191.** Jay, W. Consolidated carburetor and vacuum feed fuel receptacle. U. S. patent 1132942. 1915. Has a gravity-feed float chamber between the fuel receptacle, which has a vacuum feed, and the carbureting chamber, for regulating the fuel supply.

1192. Jenkins, W. F., and Jenkins, R. L. Fuel-mixing device for internal combustion engines. U. S. patent 1132351. 1915. A cylindrical casing open at one end and having a conical perforated cap on the other contains a pair of propellers mounted on a shaft, the whole being adapted to placing between the carburetor outlet and the engine-cylinder intake.

1193. Johnston, E. A., and Longenecker, C. I. Carburetor. U. S. patent 1150202. 1915. Has three fuel receptacles, one for gasolene or light oil, one for heavy oil, and one for water.

1194. Juhász, John. Carburetor. U. S. patent 1144206. 1915. Has a number of carbureting chambers with independent air and fuel supply, the air supply being regulated by a throttle valve common to all.

1195. Kane, E. J. Carburetor for internal combustion engines. U. S. patent 1144549. 1915. Has an air-throttling valve which is controlled by a governor and is so connected with the mixture-throttling valve that a limited movement of the air throttle does not change the adjustment of the mixture throttle.

1196. Keizer, L. M. Carburetor. U. S. patent 1125338. 1915. Is a constant level aspirating carburetor with a barrel valve having a hood inclosing the fuel nozzle.

1197. ——— Carburetor. U. S. patent 1125339. 1915. Has a valve-controlling device which adjusts the valves by means of a cam.

1198. ——— Carburetor. U. S. patent 1125340. 1915. Is a constant level aspirating carburetor with a barrel valve that operates a cam that in turn moves the fuel valve.

1199. Keller, M. L. Carburetor for explosive engines. U. S. patent 1129103. 1915. Fuel feed is regulated by a disk-and-needle valve operated by the air feed.

1200. Kellogg, W. S. Carburetor. U. S. patent 1144477. 1915. Fuel mixture is regulated by a perforated rotary disk valve.

1201. Kenmir, J. G., jr. Carburetor. U. S. patent 1165676. 1915. A vertical intake pipe extends into a vertical cylindrical carbureting chamber, in which the fuel is kept at a predetermined height by means of a float valve in the fuel chamber.

1202. Kent, C. B. Carburetor. U. S. patent 1141085. 1915. Has a cup-shaped air valve suspended from a fuel needle valve that acts by gravity to hold the fuel valve shut, but when raised by suction opens it.

1203. ——— Carburetor. U. S. patent 1141086. 1915. Has a piston air valve which controls the needle valve, and a Venturi tube through which the fuel valve discharges.

1204. Kimmell, H. L. Carburetor. U. S. patent 1156084. 1915. Has a link connection, operated by a movable sleeve, between the air and fuel valves.

1205. Kingston, F. L. Carburetor. U. S. patent 1156149. 1915. Has a chimney-shaped carbureting chamber and an annular fuel reservoir.

1206. Kingston, G. Carburetor. U. S. patent 1130981. 1915. Float chamber has a suction valve and a by-pass to the fuel-supply chamber.

1207. Kirby, C. H. Carburetor. U. S. patent 1159049. 1915. Has a dash pot that on sudden operation of the air valve actuates to increase the flow of fuel.

1208. Kitchen, J. G. A., and Storey, I. H. Vaporizing carburetor for oil engines. U. S. patent 1131934. 1915. Has a vertical coiled vaporizing tube surrounded by a jacketed funnel through which the air supply passes. The tube is heated with a burner fed from the tube itself.

1209. Krause, R. E. Carburetor. U. S. patent 1124918. 1915. Fuel nozzle is surrounded by a number of superimposed rings havings openings of different size for varying the area of the air inlet.

1210. Krause, R. E. Device for preheating hydrocarbons in carburetors. U. S. patent 1135195. 1915. A hollow, threaded nipple, adapted to be screwed into the wall of a carburetor, containing a helical wire of high electrical resistance, with an insulated bushing, and terminals.

1211. Leissner, H. F. Fuel gasifier for internal-com' ustion engines. U. S. patent 1136818. 1915. Fuel is gasified in a primary explosion cham' er l efore passing into the main com' ustion cham' er of the engine cylinder.

1212. Lippold, C. T. Car' uretor. U. S. patent 1146181. 1915. Has an oscillatory needle valve actuated by a diaphragm acted on l y the inrush of air caused by the suction of the engine.

1213. Lobdell, F. S. Car' uretor. U. S. patent 1152031. 1915. The mixing chambers have each a throttle valve, the valves l eing connected l y a system of levers so arranged that when one valve is closed the corresponding valve is opened.

1214. Lucas, O. D. Car' uretor for internal-com' ustion engines. U. S. patent 1150782. 1915. Has two separate cham' ers, each having an air port. The fuel inlet is in one cham' er, the other opens into the engine cylinder. Throttling devices are provided for varying the effective area of the air ports inversely to each other.

1215. Lund, J. B. Car' uretor attachment. U. S. patent 1142824. 1915. A temperature and pressure actuated device designed to l e placed l etween the vaporizing cham' er and the float chamber of a car' uretor.

1216. McAdam, L. J. Car' uretor. U. S. patent 1155829. 1915. Contains a fuel atomizer operated by compressed air.

1217. McCormack, Herbert. Car' uretor. U. S. patent 1141570. 1915. A whirling motion is imparted to the air and fuel in the mixing cham' er, any unvaporized liquid returning to the fuel nozzle.

1218. McKeen, W. R., Jr. Air heater for car' uretors. U. S. patent 1132199. 1915. A mass of material with a low heat conductivity is heated and placed in the air inlet pipe of the car' uretor.

1219. Maino, C. A., and Pellegrini, Phillip. Car' uretor. U. S. patent 1157116. 1915. Has two car' ureting chambers, one for heavy and one for light oil, discharging into a Y tube with a flap valve to regulate the proportion of vapor from each.

1220. Merriam, H. C., and York, L. M. Car' uretor. U. S. patent 1154530. 1915. Has a fan for mixing the fuel and air and delivering it under pressure to the manifold intake of the engine.

1221. Mitchell, D., Jr. Car' uretor. U. S. patent 1126249. 1915. Fuel and air valves are connected by lever arms.

1222. Monosmith, O. B. Car' uretor. U. S. patent 1125368. 1915. Fuel supply is controlled by a movable perforated plate.

1223. Moore, W. J P. Car' uretor. U. S. patent 1148247. 1915. Has a Venturi tube with a floating ball valve within it.

1224. Motsinger, H. N. Proportioning device especially designed for carburetors. U. S. patent 1140525. 1915. Has a num' er of minute air inlets and fuel-delivery inlets, so arranged that the effective delivery area of the one varies with that of the other.

1225. Muir, W. A. Carburetor. U. S. patent 1164661. 1915. The end of the fuel nozzle i- placed in an aperture in a weighted air float valve. The size of the opening in the fuel valve is varied in extent as the float is lifted.

1226. ——— Carburetor. U. S. patent 1143986. 1915. Has a device for supplying air at high velocity to the mixing tube, this air is drawn from the fuel chamber, in which a partial vacuum is created by high speeds, thus reducing the flow of the fuel.

1227. Nichols, T. J. Carburetor. U. S. patent 1156924. 1915. Contains a movable air inlet pipe extending downward, the lower end of the pipe having a nozzle, a U-shaped float above the nozzle and astride the pipe, and a lever with one arm attached to the float and the other to the fuel valve.

1228. Norton, R. P. Carburetor. U. S. patent 1135544. 1915. Has a fuel feed nozzle forming a valve seat, the valve stem being connected to a mechanism operated by the engine.

1229. Odell, J. H. Carburetor. U. S. patent 1135315. 1915. Has an L-shaped fuel nozzle mounted in an air supply pipe with a constricted neck.

1230. Oliver, F. S. Carbureting apparatus. U. S. patent 1146441. 1915. Has superimposed baffles to promote vaporization.

1231. Ottaway, W. Carburetor. U. S. patent 1128717. 1915. The mixing chamber has a number of discharge openings, each to be connected to an engine cylinder. A throttle valve is placed between these openings and the mixing chamber, a by-pass tube with an independently controlled valve connects the chamber with one of the tubes.

1232. ——— Carburetor. U. S. patent 1135046. 1915. Auxiliary inlet air valves regulate the air supply.

1233. Payne, J. J. Carburetor. U. S. patent 1148333. 1915. Has a tubular mixing chamber with slotted ends, covered by movable slotted caps actuated by a gate valve.

1234. Pembroke, C. J. Carburetor. U. S. patent 1143779. 1915. The spray head surrounding the fuel nozzle, which is in the air inlet, has a valve operated by a gate valve in the air inlet.

1235. Percival, F. N., and Patterson, W. Kerosene carburetor. U. S. patent 1150619. 1915. Heats the kerosene and air feed.

1236. Perry, Frank. Carburetor. U. S. patent 1142763. 1915. Has a throttle chamber containing a shutter to regulate the size of opening to the mixing chamber, and a slotted atomizer the size of the openings in which varies with movements of the shutter.

1237. Podlesak, H. J. Internal-combustion-engine mixer. U. S. patent 1150224. 1915. A device for feeding fuel oil and water.

1238. Pond, L. G. Carburetor. U. S. patent 1162308. 1915. Has a series of independent fuel inlets and a pair of rotatory valves which regulate the feed of air and fuel.

1239. Prescott, S. I. Carburetor. U. S. patent 1143227. 1915. Has cooperating grooved rocking valves.

1240. Rakestraw, H. L. Carburetor. U. S. patent 1140064. 1915. Has a series of baffles in the mixing chamber and means for heating the chamber.

1241. Raymond, J. W. Carburetor. U. S. patent 1124949. 1915. Has an annular spray orifice.

1242. Richard, E. C. Carburetor. U. S. patent 1149291. 1915. Has a vacuum-operated air valve that is actuated by the throttle valve, and means for heating the air and fuel mixture.

1243. Rodrigues, M. R. Carburetor. U. S. patent 1164215. 1915. A tortuous passage, along which the intake air must pass, contains a porous material which is kept wet with fuel.

1244. Rothe, W. F. Carburetor. U. S. patent 1140071. 1915. Has an outer shell with an air-intake passage through the inner shell to the carbureting chamber, which opens into the mixing chamber, and an auxiliary air chamber that opens into the mixing chamber and into the air space between the two shells.

1245. Rowell, A. F. Carburetor. U. S. patent 1151286. 1915. Has a throttle cone and a jet tube each having a choke sleeve, and means for moving the sleeves synchronously with each other to regulate the inflow of air and outflow of gas.

1246. Rubesky, W. J. Carburetor. U. S. patent 1157588. 1915. Contains a wick carrier with an annular groove and air ports in the bottom of the groove.

1247. ——— Carburetor for explosive engines. U. S. patent 1140000. 1915. The intake air flows through an oil-fed wick inclosed between an inner and an outer tube, means being provided for regulating the flow of air.

1248. Russell, E. F. L. Carburetor. U. S. patent 1127286. 1915. Has an outer casing and a rotatory inner cylinder with registering air openings, and an atomizer with a sliding sleeve.

1249. Russel, J. E. Carburetor. U. S. patent 1148461. 1915. Has a fuel-float chamber and an auxiliary air intake.

1250. Salisbury, C. K. Carburetor. U. S. patent 1129428. 1915. Has an independent needle valve in the fuel-supply tank for closing the fuel-inlet valve to the float chamber.

1251. Scaife, A. J. Carburetor. U. S. patent 1136276. 1915. Has a cylindrical rotatory valve for controlling the inflow of air and outflow of gas.

1252. Schebler, G. M. Carburetor. U. S. patent 1156823. 1915. Has a depending tubular stem forming a primary mixture inlet, which contains a fuel needle valve controlled by the movement of the air-inlet valve.

1253. Schmidt, G. F. Carbureting apparatus. U. S. patent 1137535. 1915. Describes a vaporizing plant operated by a weight and pulleys.

1254. Schmiedeknecht, V. E. Carburetor. U. S. patent 1135211. 1915. Contains a double Venturi tube with valves seated on the contractions of the tube.

1255. Schoof, W., Jr. Carburetor. U. S. patent 1135729. 1915. Has triangular air-inlet and mixture-outlet ports, with means for simultaneously closing them.

1256. Shakespeare, W., Jr., and Schmid, W. Carburetor. U. S. patent 1129129. 1915. The fuel valve is threaded through a device that actuates the valve by means of an index disk; the throttle valve is loosely mounted on the fuel valve and connected to it.

1257. Shaw, F. A. Fire-prevention means for internal-combustion engines. U. S. patent 1165914. 1915. A damper placed in the air intake of the carburetor is held open by a fusible link that in event of back firing melts, thus permitting the damper to close.

1258. Sherman, W. S. Carburetor. U. S. patent 1137238. 1915. Fuel feeds into the center of a revolving bowl and is discharged from the edge of the bowl in a thin film across the intake-air current.

1259. Shipman, R. Carburetor for explosive engines. U. S. patent, reissue, 13903. 1915. Has a hinge valve in the air intake in front of the fuel nozzle, to regulate the air and fuel feed.

1260. Shores, W. P. Carburetor. U. S. patent 1156716. 1915. Has a pair of propellers with perforated blades for mixing the air and fuel.

1261. Shortt, E. G. Caburetor. U. S. patent 1133754. 1915. Has a valve with opposing springs to regulate the flow of air and fuel.

1262. Simpson, E. J. Carburetor. U. S. patent 1162111. 1915. A vertical sleeve is connected to the fuel-inlet valve and has ports registering with the mixture-outlet ports. When the sleeve is rotated, it closes the outlet ports and also shifts longitudinally on its axis, closing the fuel valve.

1263. Slaby, R. Carburetor. U. S. patent 1160662. 1915. Fuel nozzle discharges into a hollow cap that imparts a whirling motion to the fuel. The cap has a number of apertures opening into the mixing chamber.

1264. Smilie, R. H. Carburetor. U. S. patent 1139914. 1915. Fuel valve and air-inlet valve are connected by a lever for regulating the feed of air and fuel.

1265. Smith, C. D. Carburetor. U. S. patent 1145871. 1915. Fuel-inlet valve to mixing chamber has an adjustable seat.

1266. Smith, E. S. Carburetor. U. S. patent 1141276. 1915. The fuel chamber contains a flexible U-shaped tube supported on the surface of the fuel by a float and having a fuel jet with a constricted neck that dips into the fuel; one end of the tube is open to air and the other is connected to the inlet of the engine.

1267. Smith, I. M. Carburetor. U. S. patent 1158324. 1915. Has a rotary impact motor, or air-driven turbine, in the air inlet.

1268. Sohon, F. Carburetor. U. S. patent 1134021. 1915. Has an aspirator regulated by the partial vacuum in the carbureting chamber.

1269. Speed, J. A. Carburetor. U. S. patent 1145172. 1915. Has an arrangement of valves providing a vent passage to the atmosphere in case of back firing.

1270. Stamps, N. C. Carburetor. U. S. patent 1140721. 1915. Has a circuitous carbureting passage and a secondary air feed.

1271. ——— Carburetor. U. S. patent 1140722. 1915. Has a slide valve in the air inlet connected to the throttle valve; a cam carried by the slide operates the fuel needle valve.

1272. Swan, J. W. Carburetor. U. S. patent 1123127. 1915. Has a special type of throttle valve.

1273. Terry, E. Jet nozzle for carburetors. U. S. patent 1147763. 1915. An ejector fitted with a cap having a gauze covered orifice.

1274. Thompson, E. J. Carburetor. U. S. patent 1130350. 1915. Has a plunger forming between itself and a part of its casing a restricted air passage of variable size: this plunger is actuated by the engine and is connected to the fuel valve.

1275. Thurot, J. L. T. Carburetor. U. S. patent 1158589. 1915. Has two auxiliary air passages, one of which is constantly open, and a plug valve having an end port controlling the other, and a butterfly valve controlling the main air inlet.

1276. Tice, P. S. Carburetor. U. S. patent 1123955. 1915. Has an aspirating device and a passage for equalizing the air pressure above the liquid in the fuel chamber and in the air passage between the aspirator and the throttle.

1277. Udale, S. M. Carburetor. U. S. patent 1145824. 1915. Has a hollow sliding air valve so mounted that it also regulates the flow of fuel.

1278. Uncles, H. W. Carburetor. U. S. patent 1143092. 1915. Has a shunt passageway for regulating the fuel and the air supply.

1279. Veeder, C. H. Carburetor. U. S. patent 1127120. 1915. Has a fuel nozzle the area of which automatically varies in direct proportion to the pressure of the oil before it reaches the nozzle, thus maintaining constant pressure at the nozzle regardless of the rate of discharge.

1280. Watts, F. E. Carburetor. U. S. patent 1159446. 1915. Air inlet extends through the exhaust conduit of the engine.

1281. Webb, J. A. Carburetor. U. S. patent 1152134. 1915. Has a heating chamber and a flexible trackway which is operated by the throttle lever and engages the inlet valves.

1282. Wetterhaun, E. Carburetor. U. S. patent 1155457. 1915. Has an adjustable spray feed for low-grade oil and a tube for feeding priming oil into the engine while the carburetor is getting warmed.

1283. Wildy, T. Spray carburetor. U. S. patent 1131584. 1915. Spray pipes contain a number of balls that regulate the air feed.

1284. Williams, L. A. Carburetor. U. S. patent 1130950. 1915. A piston valve controls the fuel nozzle and also regulates the area of the air inlet.

1285. Winger, T. O. Carburetor. U. S. patent 1155184. 1915. Air feed is controlled by a rocking hollow deflector with a variable counterbalance arm.

1286. Winkley, E. E., and Hart, F. V. Carburetor for hydrogen motors. U. S. patent 1145854. 1915. Has a device for deflecting air against a depression in the bottom of the carbureting chamber to vaporize any excess of fuel.

1287. Wolfe, R. U. Vaporizer and carburetor for gas engines. U. S. patent 1127709. 1915. The vaporizing chamber is heated and is provided with drains for removing any unvaporized fuel.

1288. Wyman, H. B. Carburetor. U. S. patent 1133904. 1915. Vertical swinging valves control the supply of air, and also actuate a perforated sliding tube on the end of the fuel supply tube to control the fuel feed.

VAPORIZERS AND SPRAYERS—PATENTS.

1289. Bee, F. G. Vaporizer. U. S. patent 1135151. 1915. Vaporizer consists of two concentric cylinders, the annular space between them being divided into two noncommunicating chambers for oil and air, with separate inlet and outlet pipes. The engine exhaust discharges through the inner tube; the outlet pipes are connected to the air and the fuel supply openings of the carburetor.

1290. Best, A. H. Mechanical atomizer. U. S. patent 1146394. 1915. A liquid fuel atomizer burner including an outer cylinder with a hemispherical end having a knife-edge hole at the center, and a close-fitting spirally grooved inner member, which is adjustable, the two being connected with flanges. The oil is discharged in a fan-shaped spray.

1291. Boutet, G. J. Vaporizer for internal combustion engines. U. S. patent 1140944. 1915. A metallic mass in a chamber between the inlet valve to the cylinder and the cylinder itself, and a metallic cap mounted on the end of the piston, are heated by the gases from the explosions.

1292. Brodbeck, A. Oil vaporizer and mixer. U. S. patent 1148440. 1915. In a generator having a gas receiver and an air receiver and a mixing tube common to both receivers, a coupling member is interposed between the receivers and the mixing tube that has a bottom shaped like the frustum of a cone, forming an annular pocket for catching the sediment.

1293. Butterfield, A. W. Oil vaporizer. U. S. patent 1129845. 1915. A device for vaporizing oil by means of live steam, the oil and steam impinging on baffles in a casing.

1294. Crouch, T. C. Fuel atomizer for internal combustion engines. U. S. patent 1142674. 1915. A combination atomizer and gasket consisting of a number of wire gauze sheets, the outer edges being soldered together to form a gasket and the inner parts being bowed out to separate the sheets, with means to keep the sheets in position. The device is placed in a flanged coupling.

1295. Doble, J. A. Vaporizing apparatus for hydrocarbon fuels. U. S. patent 1151090. 1915. A burner with a casing inclosing one side and provided with peripheral openings for air, the outlet from the casing and the inlet to the burner being connected by a passage containing a rotary fan, operated by a motor. The fuel discharges into the passage and the fan atomizes it and mixes it with the air.

1296. Fox, H. C. Vaporizer and burner. U. S. patent 1145135. 1915. Includes a fuel receptacle, a distributing block containing a number of channels, and a loop-shaped vaporizer connecting the channels, a vapor nozzle, which discharges into a burner tube that also heats the loop, and means of regulating the flow of fuel.

1297. Griesbach, H. S. Vaporizer for internal-combustion engines. U. S. patent 1142090. 1915. Consists of a detachable cylinder, having a spark-plug aperture, a thin metal tube extending through the casing, and a nipple to be screwed into the spark-plug opening of the engine cylinder. In multicylinder engines, a separate casing is to be attached to each cylinder, a vaporizer tube passing through all the casings.

1298. Halliday, T. E. Vaporizer for use with internal-combustion engines. U. S. patent 1157101. 1915. Consists of a vaporizing pipe, surrounded by a jacket through which the exhaust gases from the engine pass, with a number of cross-tubes and partitions to increase the heating surface.

1299. Hamill, W. W. Liquid fuel spraying device. U. S. patent 1143700. 1915. An expansible and adjustable spray cap.

1300. Kramer, B. Fuel pulverizer for internal-combustion engines. U. S. patent 1142440. 1915. The fuel is discharged under pressure into a pulverizer situated within a jacketed, water-cooled chamber on the cylinder end and forming part of the cylinder casting. A needle valve in the pulverizer controls the admission of fuel into the cylinder.

1301. MacDonald, H. P. Vaporizing device. U. S. patent 1147416. 1915. The oil drips onto a porous pad heated by an electric element.

1302. MacDonald, R. H. Gasoline vaporizer. U. S. patent 1128470. 1915. Vaporizing chamber contains hollow baffles having minute outlets and means for supplying air to the baffles in regulated quantity.

1303. Mansbridge, A. W., and Nash, S. J. Vaporizing attachment. U. S. patent 1130915. 1915. With an engine carburetor having the usual oil well is combined a receptacle, opening into the well, in which the oil is heated by electricity.

1304. Roberts, D. Vaporizer for internal-combustion engines. U. S. patent 1124061. 1915. Comprises a water-jacketed neck, which forms part of the cylinder, having a hot part, on the end of the cylinder, against which the fuel is injected.

1305. Schneider, F. W. Oil vaporizer. U. S. patent 1146208. 1915. The vaporizing chamber has a steam inlet at the top and a steam outlet at the bottom. The lubricant enters near the top and flows down over a series of staggered inclined trays, the steam being deflected onto the trays to vaporize the lubricant.

1306. Stuart, C. V. Process of atomizing and burning hydrocarbons. U. S. patent 1164139. 1915. By means of a small fan a current of oil and air is forced under pressure along a spiral tortuous passage through a constricted aperture into a larger chamber.

1307. Vose, W. F. Electrically controlled vaporizer for internal-combustion engines. U. S. patent 1150562. 1915. Designed to be attached directly to the engine casing. Has a mixer valve operated by the suction stroke of the engine, a fluid chamber from which the oil flows through a nozzle to the mixer valve, and means of admitting air to the mixer valve.

1308. Whiting, H. E. Vaporizer for internal-combustion engines. U. S. patent 1130228. 1915. A choke chamber about the extensible fuel nozzle can be adjusted to correspond to the length of the nozzle.

1309. Wigelius, S. G. Fuel sprayer. U. S. patent 1130229. 1915. Fuel chamber has a spring valve for feeding the fuel, which is operated by a valve that admits air under pressure to the fuel chamber, this valve being operated by a reciprocating spindle valve actuated by the engine.

1310. Winans, J. C., and Kelley, H. Kerosene vaporizer and gas generator. U. S. patent 1150725. 1915. Has a hollow base and hollow bottom, with provisions for pipes, gas mixer, and burner.

1311. Winton, A. Oil vaporizer for combustion engines. U. S. patent 1146679. 1915. Consists of an electrically heated oil vaporizer placed within the combustion chamber of the engine cylinder, with means for regulating the delivery of fuel, which is maintained under pressure by means of a pump operated by the engine.

## BITUMEN FUELS FOR INTERNAL-COMBUSTION ENGINES.

1312. Aufhäuser, —. Brennstoffe und Motorentreibmittel in Kriegszeiten (Fuel and motor fuel in war times). Chem. Ztg., Jahrg. 39, July 21, 1915, pp. 545–547. Reviews conditions in Germany.

1313. Automobile. Car and carburetor design suitable for driving with any fuel. Vol. 33, 1915, pp. 288–291, 298. Discusses carburetors working with automatic brake action on fuel feed at high speed by admission of air in the jet.

1314. Lewes, V. B. Motor fuels. Jour. Roy. Soc. Arts, vol. 63, 1915, pp. 757–763, 773–780, 792–799; Am. Gas Light Jour., vol. 103, 1915, pp. 165–167. Lectures cover production, properties, uses, and performance of petrol and petrol substitutes.

1315. Petroleum World. Fuel oils for Diesel engines. Vol. 12, 1915, pp. 147–149. Describes examination, apparatus, and methods used.

### FUELS FOR GAS AND GASOLINE ENGINES—PATENT.

1316. Blieberger, G. Fuel for kinetic engines and method of making the same. U. S. patent 1158367. 1915. Designed to utilize kerosene and relatively heavy oils.

### FUELS FOR HEAVY OIL ENGINES.

1317. Engineer. The Blackstone oil engine. Vol. 119, 1915, pp. 402–404. Engine described as running successfully on poor fuel oils.

1318. Mining and Engineering World. Utilizing low-grade fuel oil. Vol. 42, 1915, p. 50. Describes operation of low-grade oil engine; will burn any petroleum distillate, including residuum, fuel oil, and crude oil.

*See also* No. 813.

## SUBSTITUTES FOR BITUMINOUS FUELS IN INTERNAL-COMBUSTION ENGINES.

1319. American Gas Light Journal. Peroxidized kerosene as motor fuel. Vol. 102, 1915, p. 183. Description of production and properties.

1320. Bruhn, H. K. Naphthalene as a motor fuel. Jour. Gas Lighting, vol. 132, 1915, pp. 644–645; Jour. Soc. Chem. Ind., vol. 35, 1916, p. 165. Properties of naphthalene and its use in internal-combustion engines; statistics given on naphthalene engines and relative consumption and cost of fuels per horsepower of petrol, benzol, and naphthalene.

1321. Donath, E. Ueber Benzin-Ersatzstoffe für den Autobetrieb (Substitutes for benzine for use in automobiles). Oelmotor, Jahrg. 3, 1915, pp. 470–471; Petroleum Ztschr., Jahrg. 10, 1915, p. 485. Discusses derivation of substitutes.

1322. Garlepp, –, and Others. Substitutes for materials seized (in Germany) in the interest of defense. Ztschr. Ver. Deut. Ing., Jahrg. 59, 1915, pp. 457–463, 478–485; Chem. Abs., vol. 9, 1915, p. 2571. Substitutes for lubricating oils and for benzine for power purposes are discussed, also, petroleum for lighting purposes, rubber and copper conductors, and use of coke and by-products.

1323. Hempel, W. Ueber den Ersatz des Benzins durch Spiritus zum Betrieb der Automobile (Motor spirit as a substitute for benzine for driving automobiles). Oelmotor, Jahrg. 3, 1915, p. 392. Discusses use of gasifier. Washed light oil is recommended. Pure petroleum spirit causes motor rust.

1324. Journal of Industrial and Engineering Chemistry. Gasoline substitutes. Vol. 7, 1915, p. 257. Data on calorific value of several liquid fuels and specifications for substitute fuels.

1325. Lewes, V. B. Motor fuels; the question of petrol substitutes. Petroleum Rev., vol. 32, 1915, pp. 205–206, 235–236; Jour. Gas Lighting, vol. 129, 1915, pp. 523–524. Benzol and method of recovery; value of alcohol and use in French and German motors; use of mixtures of kerosene and benzol or petrol.

1326. Meneghini, D. Substitutes for benzine in explosion motors: II. Velocity of gasifying. Ann. chim. applicata, t. 3, 1915, pp. 235–244; Chem. Abs., vol. 9, 1915, p. 1993. Describes apparaus, methods, and results of evaporation tests of alcohol, benzene, and toluene, in pure and commercial form, and their mixtures. $CH_3OH$ and $C_3H_7OH$ were also tested.

1327. ——— Substitutes for benzene in internal combustion traction motors. Ann. chim. applicata, t. 3, 1915, pp. 1–8; Chem. Abs., vol. 9, 1915, p. 1244. States the properties to be considered in selecting a mixed oil as a substitute for benzene, the chief ones being that the mixture must gasify as a whole, and must remain fluid and vaporize with relative ease at low temperatures.

1328. Oil and Gas Journal. New substitute for gasoline? Vol. 13, Mar. 4, 1915, p. 3. Discovery in South Africa of "natalite," an alleged motor fuel.

1329. Watson, W. Benzene, alcohol, and mixtures of these liquids with petrol as fuel for internal combustion engines. Inst. Automob. Eng., 1914, Sept. 20. Jour. Soc. Chem. Ind., vol. 34, 1915, pp. 266–267. Describes carburation tests, gives results of the tests, and discusses their application to motor problems.

## PATENT.

1330. Stevens, W. H. Substitute for gasoline. U. S. patent 1165462. 1915. One substitute proposed consists of a mixture of crude oil, gasoline, ether, and pulverized alum; another is composed of crude oil (petroleum), gasoline, ether, pulverized alum, and oil of citronella.

## ALCOHOL.

1331. Chemical Trade Journal. A new alcohol fuel, "Natalite." Vol. 56, 1915, p. 554. Consists mainly of alcohol and ether, about 40 per cent of ether being present.

*See also* Nos. 1325, 1326.

## BENZOL.

1332. Journal of Industrial and Engineering Chemistry. Benzol as fuel. Vol. 7, 1915, pp. 73–74. Dependence of Germany on benzol for fuel; statistics of benzol production in Germany; increased use in England due to high price of gasoline.

1333. Marks, A. Benzol as a motor fuel: impurity troubles. Gas World, vol. 62, May 1, 1915, Coke section, p. 15. Discusses impurities in benzol, and tests.

1334. National Petroleum News. Benzol not to affect "gas" consumption. Vol. 7, December, 1915, pp. 38, 40, 41. Investigation results in conclusion that total production of benzol, as a satisfactory motor fuel, would not affect market greatly; potential production only about 100,000,000 gallons.

1335. Terres, E. Ueber die Verbrennung von Benzol in Explosionsmotoren (Benzol as a fuel in explosion motors). Oelmotor, Jahrg. 14, 1915, pp. 204–214; reviewed in Petroleum Ztschr., Jahrg. 10, 1915, p. 443. Substitution of benzol for benzene in Germany; changes necessary in motors for use of benzol.

## TAR.

*See* No. 1073.

## DOMESTIC HEATING.

1336. Hutchinson, F. R. Gas house-heating; its cost and application. Proc. Nat. Gas Assoc. of Am., vol. 7, 1915, pp. 303–377; discussion, pp. 377–383. Data on methods of heating houses, giving cubical contents, square feet of radiation, season's cost, etc.

## STRUCTURAL PURPOSES.

### PAVEMENT AND ROAD BUILDING AND MAINTENANCE.

1337. Agg, T. R. The proper method of applying oil as a dust preventative. Oildom, vol. 5, June, 1915, pp. 29–34. Discusses kinds of oil, preparation of street, grading, cost of surface oiling, and oiling macadam roads.

1338. Boorman, T. H. Asphalts, their sources and utilizations, containing five new chapters on road construction. New York, Wm. T. Comstock Co., 1914, 191 pp., il.

1339. Crosby, W. W. Dust prevention. Canadian Engineer, vol. 28, 1915, pp. 532–533.

1340. Currie, A. C. The construction of roads in cities. Canadian Engineer, vol. 28, 1915, pp. 378–380. Describes different types of roads, asphalt, asphalt macadam, asphalt and stone blocks, and tar macadam.

1341. Engineering and Contractor. The cementing value of bituminous binders and results obtained in some commercial tests. Vol. 43, 1915, pp. 41–42. Detailed description of apparatus and results of modification of ductility test.

1342. Engineering Record. How oiled earth roads are built in Kansas. Vol. 72, 1915, p. 193. Preparation of soil, kinds of oil used, and application.

1343. ——— Iowa experiments with oil on dirt roads. Vol. 72, 1915, pp. 15–16. Gives benefits, limitations, and costs with reference to rural communities.

1344. Hemstreet, G. P. Asphalt block pavement. Cornell Civil Engineer, vol. 23, 1915, pp. 350–365. Discusses manufacture, laying, cost, etc.

1345. Johns, O. D. Asphalt paving in the grounds of the Panama-Pacific Exposition. West. Eng., vol. 5, 1915, pp. 306–307. Explains type and construction and surfacing of macadam roads.

1346. Jones, E. C. The effect of leaking illuminating gas on bituminous pavements. Am. Gas Light Jour., vol. 102, 1915, p. 25. Gas, instead of impairing asphalt, increases its elasticity and usefulness by adding hydrocarbons to it; criticism of paper by G. C. Warren. (*See also* No. 1354.)

1347. Municipal Engineering. Wood fiber and asphalt as paving. Vol. 48, 1915, pp. 292–293. Method of laying and materials used.

1348. Municipal Journal. Surface oiling of city streets. Vol. 38, 1915, pp. 653–654. Suitable oils, preparation of streets, and application.

1349. Official Good Roads Year Book of the United States. Dust preventives. 1915. pp. 150–152. Discusses use of water, sea water, "glutrin," waste molasses, petroleums, coal tars, etc.

1350. Smith, H. E. Surface treatments and bituminous construction. Cornell Civil Engineer, vol. 23, 1915, pp. 324–335. Discusses wearing course of bituminous pavements.

1351. Standard Oil Bulletin. The Tacoma Speedway. Vol. 3, July, 1915, pp. 12–15. Method of building and use of Richmond road oil on surface.

1352. United States Department of Agriculture. Progress reports of experiments in dust prevention and road preservation, 1914. Bull. 257, 1915, 44 pp. Describes use of oils, tar preparations, and calcium chloride-coralline rock.

1353. Voshell, J. T. Experimental concrete roads. Cement Eng. News, vol. 27, 1915, pp. 91–92. Discusses bituminous and asphalt materials for coatings. *See also* No. 1346.

1354. Warren, G. C. The effect of leaking illuminating gas in bituminous pavements. Proc. Am. Soc. Munic. Improvements, vol. 21, 1915, pp. 304–318. Results show that the asphalt increases in weight, becomes liquefied, and loses binding power, the gas thus causing serious damage to pavements. (*See also* No. 1346.)

1355. Watson, G. L. Sheet asphalt for Florida roads. Munic. Jour., vol. 39, 1915, pp. 503–506. Gives details of construction.

*See also* Nos. 809, 810, 811.

## ROOFING—PATENT.

**1356.** Smalley, H. S. Asphalt roofing. U. S. patent 1164965. 1915. A bituminous roofing sheet having sheet of paint-receiving paper cemented to it by an asphaltic cement.

## WATERPROOFING AND PRESERVING.

**1357.** Fuel Oil Journal. Southern Pacific using Mexican crude for treating railroad ties. Vol. 6, May, 1915, p. 34. Gives cost data, showing that it is cheaper than creosote. The oil is used to seal pine wood against moisture.

**1358.** Hunt, G. M. The preservative treatment of farm timbers. Wood preserving, vol. 2, 1915, pp. 67–68. Crude oil can not be depended upon to prevent decay.

**1359.** Moll, F. The protection of wood against decay by means of paints and coatings. Kunststoffe, Jahrg. 5, 1915, pp. 169–171, 182–185, 210–212, 219–222. Discusses tar and bitumen materials, also mixtures of petroleum with other materials; bibliography.

**1360.** Page, L. W. Oil-mixed Portland cement concrete. Bull. 230, U. S. Dept. of Agric., 1915, 26 pp. Discusses the effect of mineral oils on the tensile and compressive strengths and time of setting. Gives properties oil should have and methods of preparing waterproof concrete.

**1361.** Proctor, H. R. Waterproof sole leather. Leather Trades Rev., vol. 48, 1915, p. 648. Describes a waterproofing compound consisting partly of paraffin scale and method of treating leather with the compound.

**1362.** Quimby, H. H. Waterproofing of solid steel-floor railroad bridges. Proc. Am. Soc. Civ. Eng., vol. 41, 1915, pp. 225–240, 459–479, 729–746, 917–920. Adhesive tests of cotton duck saturated with bitumen on steel and 1:2:4 concrete specimens showed superior adhesiveness of bitumen to steel.

**1363.** Von Vloten, H. K. Resinates for preserving wood and textiles. Chem. Weekblad, Jahrg. 12, 1915, pp. 160, 483–484. Resinates of Cu and Hg dissolved in gasoline and kerosene may be used as preservatives against moisture.

**1364.** Wandrowsky, H. Waterproofing of paper. Papier Ztg., Jahrg. 40, 1915, pp. 500–501, 524–525, 579–580, 597–598, 615–616, 653–654. Describes various processes of waterproofing, giving the reagents used and the method of application.

### PATENTS.

**1365.** Carr, J. W. Wood-preserving compound. U. S. patent 1150499, 1915. Compound consists of a liquid mixture of pine tar, linseed oil, rosin oil, and kerosene oil.

**1366.** Gross, C. W. Leather-toughening composition and process of making same. U. S. patent 1149645. 1915. Describes a composition comprising rosin, red shellac, linseed oil, mutton tallow, and gasoline, also process of preparation.

**1367.** Lobert, F. A. Composition for pipes and railroad ties. U. S. patent 1124045. 1915. Consists of rock asphaltum, 1 ounce; karl asphaltum, 1 ounce; marl, 15 ounces; asbestos, one-half ounce; sulphur, one-half ounce; salt, 1 ounce; seaweed, 2 ounces.

**1368.** Smith, S. T. Rubber-preservative composition. U. S. patent 1156561. 1915. Consists of a mixture of cocoa butter, castor oil, and gasoline, or of materials having properties similar to those mentioned.

**1369.** Stehm, F. R. Waterproofing compound for cement, concrete, and the like. U. S. patent 1141848. 1915. Sixty gallons of kerosene, 10 pounds of spermacetic wax, and 2½ gallons of cottonseed oil are mixed and heated hot enough for the kerosene to dissolve the wax, and about 12 part of water added.

## LUBRICATION.

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**1371.** ——— Motor cylinder lu' rication. Jour. Am. Soc. Naval Eng., vol. 27, 1915, pp. 83–96; Jour. Am. Soc. Mech. Eng., vol. 37, 1915, pp. 293–294. Discusses the effect of the heat in the cylinder on the oil supplied for lu' rication, and the products formed, and compares asphaltic-l ase and paraffin-base oils.

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*See* No. 1408.

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## PUBLICATIONS ON PETROLEUM TECHNOLOGY.

A limited supply of the following publications of the Bureau of Mines has been printed and is available for free distribution until the edition is exhausted. Requests for all publications can not be granted, and to insure equitable distribution applicants are requested to limit their selection to publications that may be of especial interest to them. Requests for publications should be addressed to the Director, Bureau of Mines.

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# INDEX.

NOTE.—In this index the names of the authors are printed in heavy type; the word "oil" used by itself signifies petroleum, but the word "gas" by itself does not signify natural gas; "oil fields," "gas fields," "oil statistics," "gas statistics" etc., refer to petroleum and natural gas.